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Editorial

The Port of Bayonne, France.

The Port of Bayonne, which is the only commercial ocean port on the French coast south of Bordeaux, is situated at the mouth of the River Adour, roughly 175 miles from Bordeaux and about 23 miles north of San Sebastian, which is just across the Spanish border.

The first intimation of Bayonne as a port was in the 13th Century, at which time it was under English rule, but difficulties arose in 1450 through the mouth of the River Adour shifting, and therefore making navigation difficult and with a consequent loss of trade. In 1579 a new channel was cut to re-establish a safe passage for vessels to enter, and work was continually undertaken on this channel right up to 1895 when a project was carried out for converting the open jetties which then existed, into solid ones, and also for the removal of sand and gravel, which had accumulated in the channel, by dredging.

The Port of Bayonne extends over the whole course of the River Adour from Bayonne to the sea, which is a length of about four miles, and the navigable channel has a minimum depth of 16½ ft. at L.W.O.S.T.

The length of quayage at which ships can berth is 4,460 metres, and the mechanical handling plant available is composed of fifty cranes of various sizes and two transporters. The Port of Bayonne also has available three bulk-oil installations, one being reserved for petroleum, another for bitumen and another for tar.

The warehousing accommodation is very limited owing to the fact that the trade at the Port of Bayonne is mainly confined to heavy goods.

The traffic at the Port of Bayonne, in common with all other world ports, has decreased considerably in the past few years. Imports at the Port of Bayonne for 1913 totalled 703,494 tons, but this figure had decreased by over 200,000 tons when compared with 1933, imports for this year being 495,597 tons. Exports have shown a still larger decrease, the quantity of goods exported in 1913 amounted to 321,697 tons, whereas in 1933 exports only amounted to 60,998 tons.

An illustrated article on the Port of Bayonne appears on another page, and Bayonne also forms the supplement for this month's issue.

New Coaling Staith to be Constructed on the Tyne.

The Tyne Improvement Commission at a recent meeting decided to construct a new coaling staith on the south bank of the River Tyne, and a guarantee for the shipment of 1,000,000 tons of coal per year over this staith has been made by a Colliery Company. The necessity for the construction of a new staith has arisen through the Colliery Company finding their present staiths totally inadequate to meet the needs of shipping to-day.

The new coaling staith will be 1,300 ft. in length with a depth of 25 ft. at low water and 40 ft. at high water, and this could be eventually increased to 30 ft. at low water and 45 ft. at high water. The new staith will have three radial shipping towers, and these will be fed by belt conveyors which together will be capable of loading 500 tons of coal per hour at a belt speed of 350 ft. per minute.

The new staith, which will be situated at Hebburn, will be able to accommodate vessels up to 10,000 tons, and will undoubtedly assist to a great extent in reviving the coal trade at Newcastle, though this has been showing a marked tendency towards recovery in the past few months, as is shown by the fact that during the last five months there has been increase in coal shipments of over 700,000 tons from the Tyne. The month of May alone showed an increase of over 200,000 tons.

Bromborough Dock Progress.

Since the opening of Bromborough Dock, which is owned by Lever Bros., Ltd., soap manufacturers, there has been a steady increase in traffic. Inward tonnage for 1933 was 212,844, compared with 182,159 in 1932 and 109,080 in 1931, the year in which the dock was opened. Outward tonnage was 67,483 in 1933,—38,997 in 1932 and 7,664 in 1931. The figures relating to vessels which used the dock are:—Foreign inwards, 1933—157; 1932—139; 1931—48. Coastwise, 1933—391; 1932—160; 1931—53.

Recently, there has been added to the dock equipment, storage accommodation for 10,000 tons of kernels and kindred bulk seeds, and arrangements have been made for the rapid direct discharge of these cargoes from the ship to the silo. The dock itself has a deep-water area of eighteen acres, and the surrounding quays provide some 2,900 lineal feet of berthage for vessels, with 84,000 sq. yds. of adjoining quay space. With its quays, the dock occupies a total of 37 acres. There is a reclamation area of approximately one hundred acres on its north and south sides, and an extensive industrial estate of over 600 acres in the immediate vicinity. The dock has a network of internal railway communication, which connects with the main line of the L.M.S. and G.W. Joint Railway.

Decline in Dock Employment.

Distribution is the first, and shipping the second, most important in order of size of the Merseyside industries. In the Social Survey of the University of Liverpool, it is stated that the shipping industry in 1932 employed only 93 per cent. of its 1924 total. Dock and river service had been subject to almost persistent decline since 1924, and it had lost one-third of its employed workers by 1932, though still standing fourth on the list as judged by employment provided in the middle of that year. Shipbuilding and repairing, tenth in order of importance in 1932, employed in that year considerably less than half the number employed in 1924. The net decline in employment over the ten year period was, in fact, greater in shipbuilding than in any other industry. Decasualisation at the docks is a subject that comes in for comment. It is conducive neither to good temper nor to good work that men should be kept for hours waiting to be employed when there is no chance at all of any employment being offered to them, states the report.

Increases in Southampton Docks Traffic.

Southampton Docks traffic returns for the first six months of 1934 make very encouraging reading, for under all the main headings—shipping, tonnage, cargo and passengers—increases were recorded, compared with the corresponding period of last year.

The volume of shipping handled at the docks in the six months was 15,650,000 tons, an increase of five per cent. over the six months ended June, 1933.

Cargo traffic also shows an increase of five per cent., both imports and exports being heavier than in the previous year. In fact, the returns for each month of the present year, so far as export traffic is concerned, show improvement over 1933.

Ocean passenger traffic, which has been so seriously curtailed, is also definitely on the upward trend, showing an increase of more than two per cent., compared with the corresponding period of 1933. There is every prospect of this increase being steadily maintained.

There is no doubt that the position of passenger traffic on the North Atlantic is a good deal better this summer than a year ago. Almost all the principal companies can point to a steady increase, and there is a growing feeling of optimism.

Pier and Harbour Improvements at Weymouth

Completion of £120,000 Scheme to Facilitate Passenger and Cargo Movements

General View of New Cargo Quay and Pier.

A COMPREHENSIVE scheme of improvements to the pier and harbour at Weymouth were completed and opened by His Royal Highness the Prince of Wales in July, 1933.

The scheme, which has involved a total outlay exceeding £120,000, is one in which the Great Western Railway, as the principal contributor of dues to the Weymouth Corporation's harbour revenue, is closely interested.

Following upon negotiations between representatives of the Great Western Railway Company and the Weymouth Corporation, an arrangement was arrived at for financing the scheme, under which the cost was divided into three categories, viz:—

(1) The main harbour works to be financed by a Corporation loan, sinking fund and interest being guaranteed by the Great Western Railway Company;

(2) The cost of permanent way, cranes, capstans, etc., to be met by the Company, and

(3) Such works as widening of quay road, pier extension, dredging, and provision of additional public amenities, to be met by the Corporation.

The need for improved accommodation at Weymouth for the Channel Islands and French traffic had been apparent for a number of years. Heavy seasonal imports of flowers, new potatoes, and tomatoes are received from Jersey and Guernsey, and broccoli and other vegetables from France, and the nature of this and other traffic dealt with at the port calls for the utmost speed in discharge from vessels and despatch by rail.

Although excellent service has been given by the Company, the work was often accomplished under extremely disadvantageous conditions, and the continued expansion of traffic tended still further to increase congestion and working difficulties.

Some idea of the extent of the increase in traffic dealt with at Weymouth will be gained from the fact that the harbour dues paid by the Great Western Railway Company to the Weymouth Corporation increased from £4,099 in 1922, to £8,541 in 1928, when French broccoli from Roscoff was first imported to Weymouth, and in each of the past three years the sum exceeded £10,000.

Previous to the completion of the present scheme, cargo vessels arriving at Weymouth were berthed at what is known as the cargo stage, use being made also of the passenger stage when necessary, and when not in use for passenger purposes.

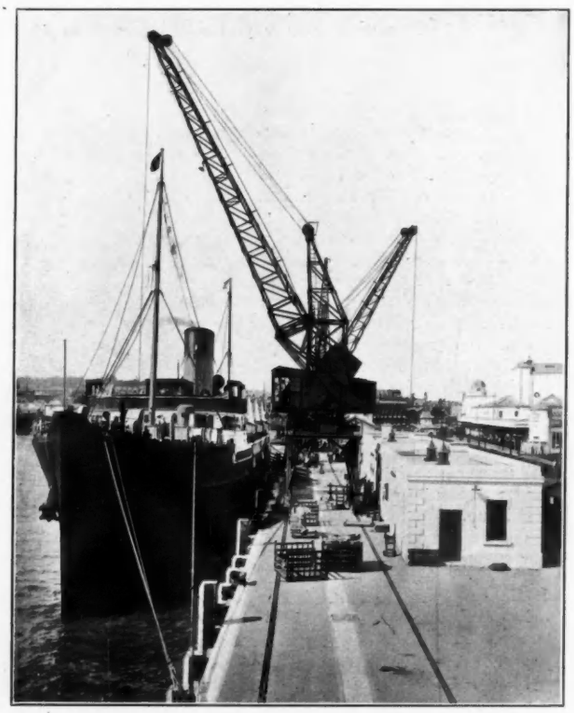
The improvements effected include the construction of a new pier, with a general width of 100 ft., following very much the same line as that taken by the old structure, which was only 30 ft. wide. As shown on the accompanying diagram, the portion of the new pier, 100 ft. wide, ends abruptly in approximately the position of the extreme end, or round head, of the old pier, but continues further seawards, 40-ft. in width, for a distance of about 260 ft. The total length of the new pier is nearly a quarter-of-a-mile.

The work, which was of considerable magnitude, is carried out entirely in reinforced concrete of two types: a solid portion, in which filling is held by retaining walls built on piles, and an open portion built entirely on piles under which a half-tide bank has been constructed to prevent silt from the bay entering the harbour.

The new pier has been designed to accommodate one passenger, three cargo, and two pleasure steamers simultaneously; berths for the latter, at the extreme end, are on either side of the extension, access to these being provided down the public promenade portion on the north side.

Up-to-date facilities exist in the shape of six electric cranes (one fixed and five travelling), made by Stothert and Pitt, Ltd., Bath, and capable of dealing with loads ranging from 30 cwt. to 5 tons, with a maximum radius of 60 ft., and capstans electrically operated. The additional berths and cranes, together with an extended double line of track in place of the former single line, will enormously facilitate the handling of cargo traffic at the port.

No less valuable will be the improved accommodation for dealing with the Channel Islands passenger traffic, which has also substantially increased in recent years. During the peak period of the holiday traffic, reached in the months of July, August, and September, the additional facilities will be of particular benefit.



"St. Patrick" alongside the New Quay.

The platform accommodation, which was formerly adequate for only four coaches, is now sufficient to accommodate 16 coaches.

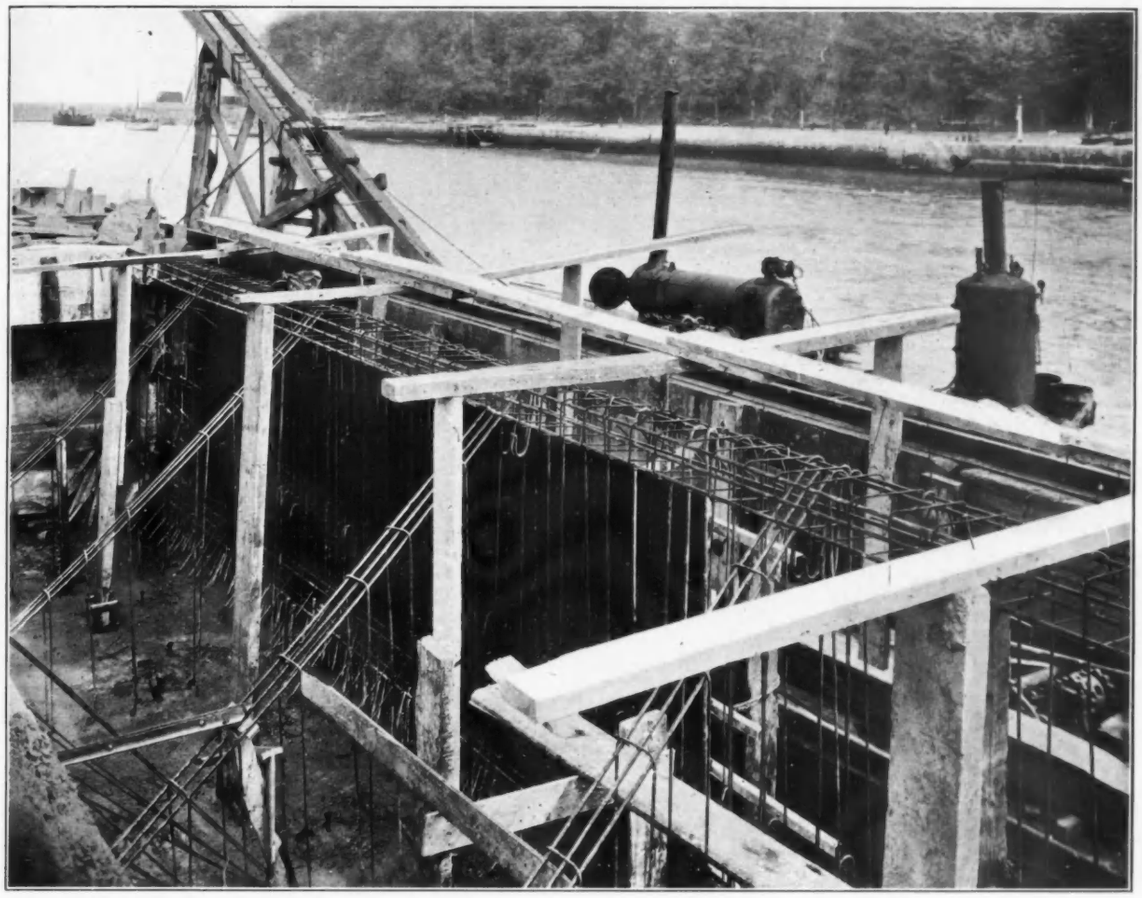
The baggage shed, directly opposite the passenger boat berth, has been extended and renovated, and gives excellent facilities for Customs examination.

A new refreshment room for passengers has also been provided.

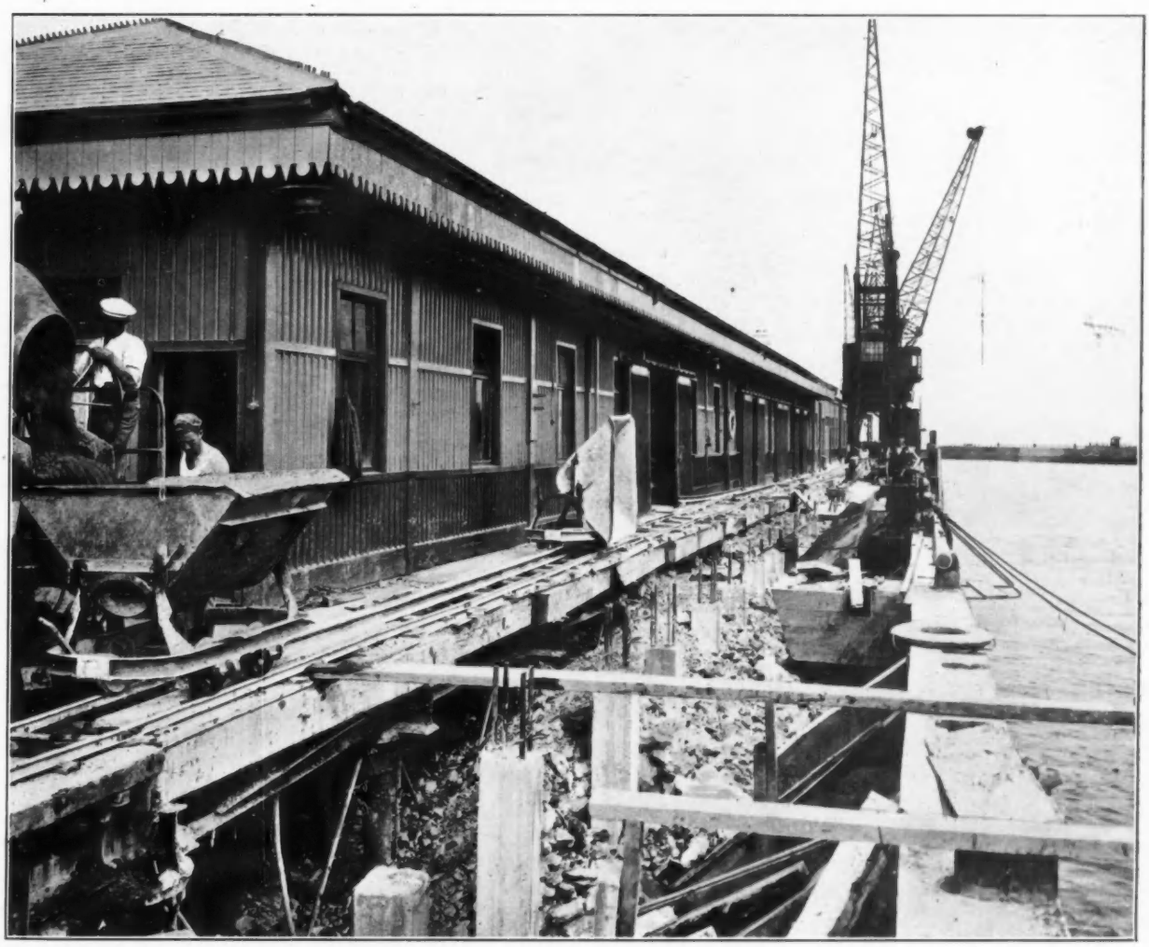
At intervals along the pier, a number of other buildings have been erected. These include mess rooms and offices for the Customs and other staff.

The whole of the pier and buildings will be lighted by electricity.

Pier and Harbour Improvements at Weymouth



Picture showing Construction of New Pier in Progress.



Picture showing Reconstruction of Landing Stage.

Pier and Harbour Improvements at Weymouth—continued

On the promenade pier every effort has been made to provide for the needs of the public. Reinforced concrete shelters, of pleasing design, have been constructed, with accessible flat roofs protected by ornamental railings; bathing facilities have been provided in the way of dressing accommodation and an elaborate diving stage; and stairways down to the water constructed at intervals along the pier for the use of small craft.

These amenities will be greatly appreciated by the thousands of holiday-makers who patronise Weymouth each year. Whatever business may be in process, it will be to the landward of the holiday-maker enjoying sea breezes on the pier extension. A wide vista of blue sea is before him, with delightful views of Portland Bill on the one hand and a long range of Dorsetshire coast on the other.

An admirable breadth of comprehension in the scheme has done justice to the claims of business and pleasure, in both of which sides of Weymouth development the Great Western Railway is interested.

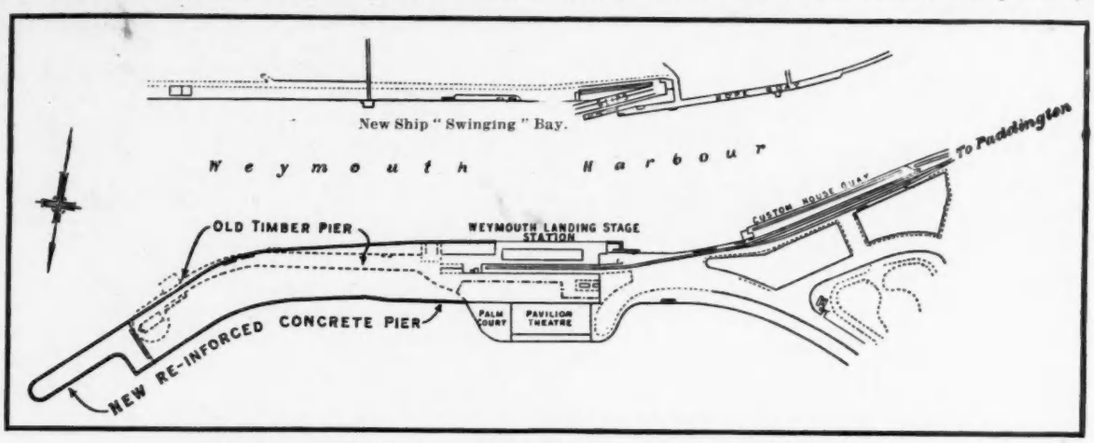


Diagram giving Outlines of the Old and New Piers at Weymouth.

The construction of the new pier and buildings was entrusted to Messrs. Bolton and Lakin, Ltd., contractors, Birmingham, the work being supervised by a resident engineer, on behalf of the Great Western Railway Co.'s Chief Engineer, in whose office, at Paddington, the whole of the plans were prepared.

Lloyd's Register Shipbuilding Returns for the Quarter ended 30th June, 1934

THE statistics issued by Lloyd's Register of Shipping regarding merchant vessels under construction at the end of June last show that in Great Britain and Ireland there is an increase of 105,702 tons in the work in hand as compared with the low figures for the previous quarter, and also that the present total—587,142 tons—is 299,640 tons (104 per cent.) greater than the tonnage which was being built at the end of June, 1933.

At the end of June the tonnage on which work was suspended amounted to 59,318 tons, being composed entirely of steamers. The amount of tonnage in course of construction maintains the upward tendency which has been observable in the quarterly totals during the last eighteen months.

About 90,000 tons—15.3 per cent. of the tonnage now being built in this country—are intended for registration abroad or for sale.

The tonnage now under construction abroad*—629,198 tons—is about 31,000 tons more than the work which was in hand at the end of March, 1934, and is the highest quarterly total recorded since September, 1932. Tonnage, included in the total in hand abroad, on which work has been suspended amounts only to 1,235 tons of steamers and 6,378 tons of motor ships.

The leading countries abroad are:—Japan, 137,280 tons; France, 104,500 tons; Germany, 91,145 tons; Denmark, 66,650 tons; Holland, 54,765 tons; Sweden, 49,025 tons; and Italy, 47,670 tons.

The total tonnage under construction in the world* amounts to 1,216,340 tons, of which 48.3 per cent. is being built in Great Britain and Ireland, and 51.7 per cent. abroad. The world total shows an increase of 137,000 tons over the figures at the end of March last, and is the highest recorded since March, 1932.

In Great Britain and Ireland, 146,653 tons were commenced during the last three months, showing a decrease of 56,359 tons compared with the corresponding total for the March quarter. During the quarter ended June, 1934, 35,954 tons were launched in Great Britain and Ireland, an increase of 1,115 tons as compared with the March quarter. Similar figures for abroad are 125,912 tons commenced, and 113,438 tons launched, showing a decrease. as compared with the previous quarter, of 132,136 tons in the tonnage commenced, and an increase of 62,175 tons in the tonnage launched.

*Excluding Russia, for which no figures are available.

Oil tankers under construction in the world amount to 39 vessels of 277,844 tons, of which 13 vessels of 101,500 tons are being built in Great Britain and Ireland, 5 vessels of 34,950 tons in Denmark, 4 of 26,770 tons in Holland, 3 of 24,900 tons in Germany, 3 vessels of 24,700 tons in Sweden, 5 of 23,400 tons in the United States of America, and 2 of 19,200 tons in Japan.

Of the 587,142 tons under construction in Great Britain and Ireland at the end of June, 279,632 tons consisted of motor ships, while at the same date the motor ship tonnage being constructed abroad (412,903 tons) was 201,370 tons in excess of that of the steamers.

The vessels being built in the world at the end of June include 4 steamers and 25 motor ships of between 8,000 and 10,000 tons each; 2 steamers and 12 motor ships of between 10,000 tnd 20,000 tons; and 4 steamers and 2 motor ships of 20,000 tons and upwards.

The table respecting marine engines shows that the horse-power of steam engines now being built or being fitted on board amounts to about 733,000 h.p.; this figure includes 43 sets of turbine engines of about 595,000 shaft horse-power. The horse-power of the steam reciprocating engines (about 138,000 h.p.) amounts to 8.8 per cent. of the total horse-power of marine engines now being built in the world. The figures for oil engines aggregate approximately 817,500 h.p.

Tonnage to Lloyd's Register Class.—Of the merchant shipbuilding in hand throughout the world at the end of June, 915,698 tons, or more than 75 per cent., are being built under the inspection of Lloyd's Register. Of this total, 555,545 tons, representing nearly 95 per cent. of the tonnage being built there, are under construction in Great Britain and Ireland; while, of the tonnage being built abroad, 360,153 tons, or over 57 per cent., are being constructed under the inspection of Lloyd's Register.

Cranes for Port Elizabeth Harbour.

Messrs. Stothert and Pitt, Ltd., Bath, England, have recently received an order from the South African Railways and Harbours for ten 4-ton electrically-driven portal jib cranes of the crank level luffing type, for Port Elizabeth Harbour.

These cranes are of similar type to the five cranes which were recently supplied by Messrs. Stothert and Pitt, Ltd., for the same harbour.

Notes from the North

Aerial view of Manchester Deep-water Docks. At the head of No. 9, the longest dock, stands No. 2 Grain Elevator, and opposite the entrance to this dock is No. 1 Grain Elevator. Mode Wheel Locks are seen in the left-hand bottom corner of the picture with the Dry Docks just above them.

Liverpool Pontoon Mishap.

A PONTOON was being removed for overhaul from the floating roadway leading to the Liverpool Landing Stage recently, when it overturned and caused a sagging in the centre of the roadway. As this rendered the bridge unsafe for traffic, it was closed for a period of five hours.

Early on the scene was Mr. L. A. P. Warner, general manager of the Mersey Docks and Harbour Board, who control the floating roadway and landing stages, accompanied by Capt. F. J. Mace, marine surveyor and water bailiff. He explained that the pontoons which support the floating roadway are periodically inspected and removed for overhaul. This work is carried out during the night and early morning hours in order to obviate delay. Unfortunately, on this occasion the pontoon which was to be removed overturned in the process, causing a sagging about the centre of the roadway and rendering the road unsafe for traffic. The pontoon turned turtle before it was actually disengaged from the structure of the bridge. There was an alarming sag, which would have been considerably more marked had a heavy vehicle attempted to negotiate it. So all traffic was suspended until the pontoon was turned right side up.

During the mishap gates were drawn across the mouth of the floating roadway, and the red-funnelled and white-funnelled luggage boats of Birkenhead and Wallasey Corporations lay motionless for five hours at the moorings on either side of the river.

The mishap had a repercussion at Widnes Transporter Bridge. Much of the ferry traffic was diverted via Widnes, and quicker-running time was necessary to cope with the increased number of motor vehicles, which also had to queue up on both sides of the Widnes Bridge.

Laxey Sea Wall.

The completed sea wall at Laxey, Isle of Man, extends the full length of the promenade. It is constructed of cement concrete and ornamented by infixed pillars, and has steps and cartways for access to the shore. To prevent sun glare, the footway has been paved with tiles of red and buff.

£50,000 Dock Fire.

Damage estimated at £50,000 was caused by a fire at Victoria Dock, Birkenhead. A coal elevator belonging to Messrs. Alfred Holt and Co., Ltd., and part of the dock shed were destroyed.

The Blue Funnel liner "Philoctetes" (11,431 tons) was lying alongside the quay, having only just finished loading, when the burning arm (weighing about 17 tons) of the coal elevator crashed from a height of about 60 ft. and hung limply, its furthermost end touching the water of the dock. Fortunately, the boat had just been moved away from the danger zone, otherwise it would have suffered serious damage. The flames spread rapidly along the belt of the elevator until there was a complete line of flame from the ground to the roof, a distance of 300 ft.

The sloping shute leading up to the tower of the elevator was very little damaged, its sides and roof being of corrugated iron, but its wooden floor was burnt out. It is thought the fire originated on the ground portion where the coal is tipped from the wagon on to the moving rubber belt. The rubber belting caught fire first, and it was the flames of the burning rubber that first attracted attention. In travelling up to the endless belt, which, through use, had become covered with particles of coal dust, the fire ignited the shute on the way, finally setting fire to the tower which stands on the quayside of the warehouses. The roof of the warehouse immediately below the sloping shute also caught fire, but this was noticed by the firemen, who immediately checked its progress. The fire started in the neighbourhood of the fuse box, which controls the electrical machinery of the coal hoist at the foot of the shute.

New Traffic for Ship Canal.

A new line of steamers from New York to Liverpool and Manchester has been arranged under the United States Lines to be run by the Roosevelt Steamship Company. The line will carry passengers and cargo from New York to both Liverpool and Manchester. This, of course, is very good news for the Manchester Ship Canal Company.

Notes from the North—continued

Dock Board Retirement.

Major E. F. Finch, T.D., solicitor to the Mersey Docks and Harbour Board, has retired. The Assistant-Solicitor, Mr. Edward Albert Moorhouse, has succeeded him. Mr. Moorhouse, the newly-appointed solicitor, is the son of the late Mr. A. P. Moorhouse, who was formerly general manager of the Cunard Line. He is a native of Liverpool, and in 1897 was articled to the late Mr. A. T. Squarey, who was at that time the solicitor to the Board. In 1925 Mr. Moorhouse was appointed assistant to Major Finch.

Examination of Dock Scales.

Mr. Francis J. Bundy, inspector of weights and measures to the Liverpool Corporation, reports that during the past year the number of weights examined for the Mersey Docks and Harbour Board totalled 9,152, and for private firms on the dock estate 2,141. Of the weighing instruments examined, 635 were beam scales, 119 platform and dead-weight machines, 21 weigh-bridges and five self-indicating automatic scales. It is interesting to learn that of the 11,000 weights that were examined 2,400 required adjustment, and of the 783 weighing instruments 109 needed attention.

Guests of Dock Board.

Thirty of the world's biggest wool merchants, accompanied by their Australian buyers, visited Liverpool as the guests of the Mersey Docks and Harbour Board, and were received by Mr. R. D. Holt, chairman of the Board. They were taken a tour of the docks. Entering the river by the Canada Lock, the "Galatea" sailed to the Gladstone Dock, where the party disembarked and inspected the dock. The Australian buyers were keenly interested in the handling and storage facilities for Australian wool, an import to Liverpool that has steadily increased during the last ten years until now about 200,000 bales are handled. Sir F. Ackroyd expressed surprise when told by a member of the Dock Board that one of the sheds inspected at Gladstone Dock was large enough to provide standing room for the population of Liverpool and district, and that in length and width it was larger than Fleet Street or Bold Street, Liverpool.

Better Ship Canal Returns.

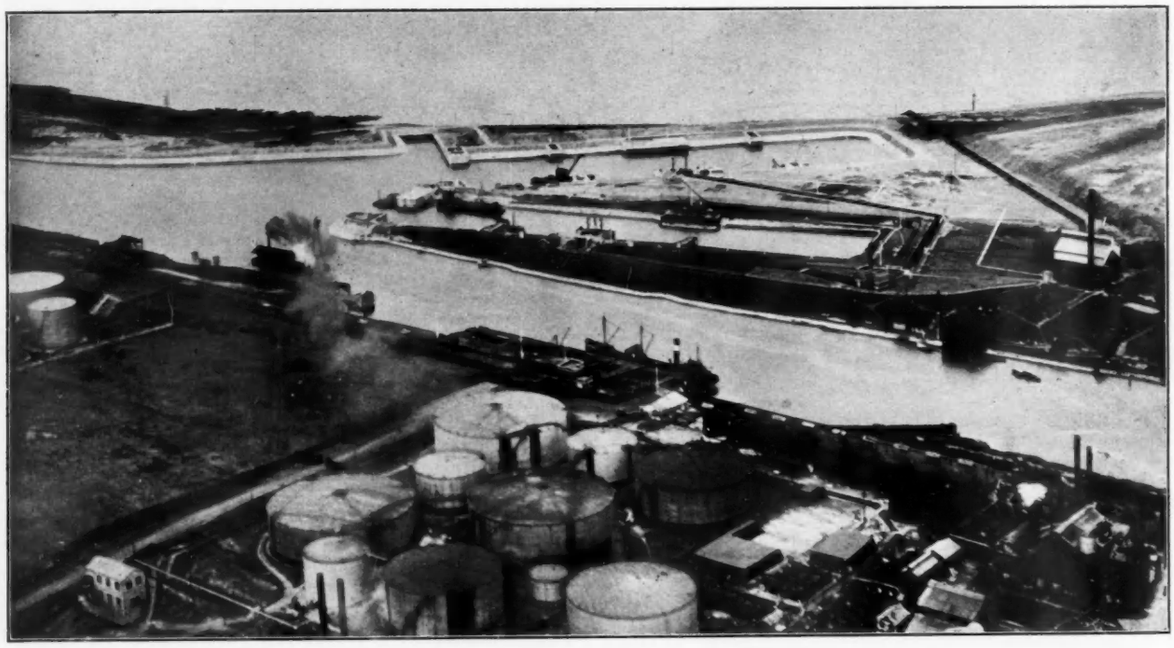
Receipts of the Manchester Ship Canal Company for June were £108,806, or £19,556 more than in the previous month and £14,824 more than in June last year. For the half-year ended 30th June, the traffic receipts amounted to £602,925; this is the largest total for the first half of the year since 1930, and it is £27,966 more than the total for the first half of last year. The net revenue of the whole undertaking for the half-year, after providing for interest and fixed charges, was £43,870 more than in the corresponding period of 1933.

The net revenue in the first half of this year appears to have been £101,938, as compared with £132,032 in the second half of 1933, £58,068 in the first half of 1933, £55,726 in the second half of 1932, £67,535 in the first half of 1932, £141,122 in the second half of 1931, and £47,147 in the first half of 1931. The present returns will no doubt lead to expectations that the year's total net revenue will continue the recovery which began last year.

Maryport Harbour.

Mr. J. T. Grisedale, clerk to the Maryport Harbour Commissioners, in his half-yearly report ending 30th June, states that no payment of interest can be made to bond-holders.

The trade of the port had fallen to such an extent that the present income is lower than the working and maintenance expenses required to keep the port functioning. The revenue for the financial year ended 25th March last only reached £3,584. The expenditure was £3,849.



Photo] [Fotaire, Ltd.

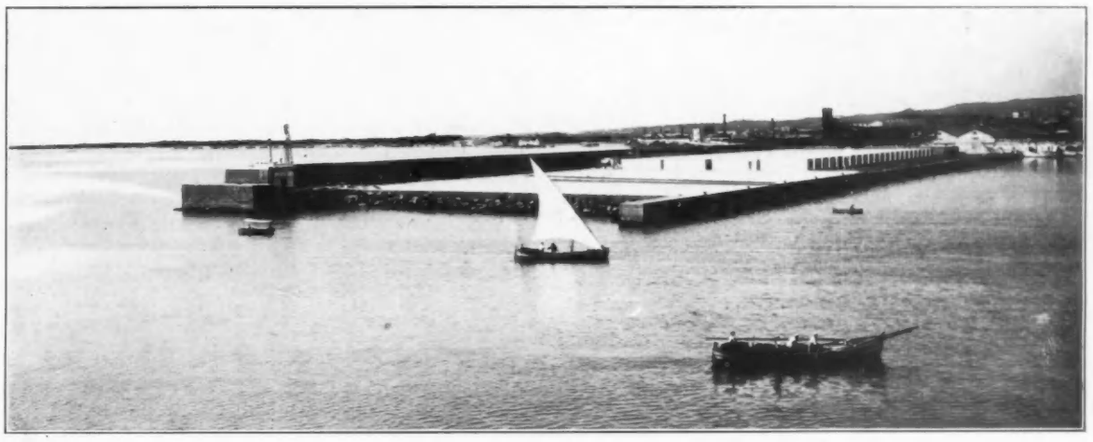
An aerial view of the Stanlow Oil Docks at Ellesmere Port. The nearer of the docks was opened in 1922 and the further dock was officially opened by the Minister of Transport (The Hon. Oliver Stanley, M.P.) on May 26th, 1933. The docks are situated on an isolated tract of land between the Mersey Estuary and the Ship Canal, which, it will be seen, separates the docks from the Oil Companies' installations on the opposite bank, the oil being discharged through pipes running in a subway beneath the bed of the Canal.

"The direction of the Court of Chancery has been sought as to what steps should be taken in the interests of all concerned. The whole matter of the dock undertaking is receiving the most earnest consideration of the Harbour Commissioners, but, as yet, no measures have been discovered, which, if taken, would bring about improvement."

Customs Hours at Docks.

Mersey Docks and Harbour Board is closely allying itself with the effort to secure Customs hours at docks and bonded warehouses, being made the same as those which obtain at the docks. Mr. L. A. P. Warner, general manager and secretary of the Mersey Docks and Harbour Board, stated at a meeting of the Council of the Liverpool Chamber of Commerce, that they desired to have the Customs hours synchronised with the working hours at the docks of the port, namely, 8 a.m. to 5 p.m. instead of 8 to 4 p.m. or 9 to 5 p.m. These latter arrangements, of course, involve the payment of overtime. The Dock and Harbour Authorities Association had the matter in hand, and were trying to push the issue to a successful conclusion. At the present time they were trying to obtain from shipowners, warehouse keepers and others the amounts they had to pay by way of overtime each year, in consequence of the present restricted arrangement. The Transport Committee of the Chamber of Commerce has had before it examples of the restriction on distribution and the losses suffered through the difference in delivery hours from specific and *ad valorem* bonds. Approaches are to be made to the Treasury in the hope of securing an alteration of the Customs hours to meet the requirements of the port.

Italian Harbour Affairs



New Pier in the Outer Harbour at Catania.

ACCORDING to statistics which have just been published by the Consorzio Autonomo del Porto di Genova, shipping at that port during the first six months of 1934 included the arrival of 2,740 vessels, representing 5,499,391 n.r.t., carrying 2,903,052 tons of goods, against 2,613 vessels, 5,081,237 n.r.t., and 2,636,991 tons of goods during the corresponding period of 1933, and the clearance of 2,746 vessels, representing 5,538,203 n.r.t., and carrying 476,546 tons of goods, against 2,596 ships, representing 5,127,360 n.r.t., with 521,186 tons of goods, during the corresponding period of 1933.

While imports have increased, exports have decreased but, as a whole, the situation of shipping during the first half-year of 1934 has been much more favourable than during the corresponding period of 1933.

The Consorzio Autonomo del Porto di Genova has also published statistics regarding the tonnage dry-docked at Alle Grazie Docks of the S.A. Ente Bacini at Genoa which, during the period under review, included 257 ships, representing 1,275,271 gross tons, against 233 ships, representing 1,259,435 gross tons during the period January to June, 1933.

In connection with shipping at Genoa, it may be added that, in the report submitted by Marquis Negrotto Cambiaso to the general meeting of the Consorzio Autonomo del Porto di Genova, it was pointed out that in the course of the past four years 205 million lire have been spent in connection with harbour improvements at Genoa. Referring to the works which have been started, the Chairman of the Consorzio Autonomo del Porto added that during the last part of 1933 and the early part of 1934 a commencement had been made on the construction of the quay walls along the last three piers of the new Benito Mussolini Docks, a new aerodrome, a breakwater on the right of the Polcevera mouth, a large concrete warehouse on the first pier of the Mussolini Docks, electric unloading and loading facilities on the two first piers of the Mussolini Docks, and the dredging of the whole port, etc. Finally, Marquis Negrotto Cambiaso illustrated the results obtained through the reduction in harbour charges. The Italian State Railways Administration has granted important reductions on the charges for shifting cars from one pier to another, and also loading of cars, in order to favour the shipment of goods through the Port of Genoa.

Shipping at Catania during the month of April, 1934, included the arrival of 214 ships, representing 195,063 n.r.t., and carrying 32,077 tons of goods, and the clearance of 213 ships, representing 194,877 n.r.t., and carrying 21,973 tons of goods. The total goods traffic in the Port of Catania during the month of April, 1934, reached 54,050 tons of goods, against 65,096 tons imported and exported during April, 1933, this being a decline of 11,046 tons.

In the course of a meeting held by the Shipping Section of the Consiglio Provincialle dell 'Economia (Chamber of Commerce and Industry) of Palermo, a discussion arose on the difficulty of unloading and loading at that port. It is necessary that shipping at Palermo should be able to utilise, as soon as possible, the new second pier under construction, and which will be fitted with mechanical unloading facilities. The construction of a breakwater at the entrance of the harbour of Palermo, which was completed some years ago, has not settled the question of the action of waves in the inner port during Northern gales. The Supreme Board of Public Works to which the question had been submitted has just approved a project according to which the breakwater will be extended northwards for a length of 100 metres and then connected to the so-called Northern Mole, while southwards the breakwater will be extended in such a way as to protect the entrance of the port from rough seas. The cost of these extensions has been estimated at 80 million lire.

According to statistics which have been published by the Consiglio Provinciale dell 'Economia Corporativa (Chamber of Commerce and Industry), shipping in the Port of Trieste during the first six months of 1934 included the following figures:—

		JANUARY-JUNE	
		1934	1933
		CENTALS	
ARRIVALS			
By Rail		3,103,378	2,317,748
By Sea		8,462,869	6,813,493
	Total	11,566,247	9,131,241
CLEARANCES			
By Rail		4,304,783	3,586,534
By Sea		3,011,790	2,231,569
	Total	7,316,573	5,818,103
ARRIVALS AND CLEARANCES			
By Rail		7,408,161	5,904,282
By Sea		11,474,659	9,045,062
	Total	18,882,820	14,949,344

Shipping at Trieste has shown an increase of about 400,000 tons in six months, and there is no doubt that if the progress continues the situation of shipping at Trieste at the end of 1934 will be practically identical to that of before the War. It is stated that the grain silos are to be completed during 1935, and that the question of replacing the old hydraulic cranes with new electric cranes on some of the piers in the Vittoria Emanuele III. freeport is being considered.

Considerable progress is being made in the construction of the breakwater at Mogadiscio (Italian Somaliland) which, when completed in 1935, will have a length of 1,350 metres, and will give a sheltered water surface of 40 hectares to shipping, though the depth of water will not be very large, and unloading and loading will have to be carried out by lighters. The question of the construction of a port at Merka, where ships have to anchor about 1,100 to 1,300 metres from the coast, making unloading and loading very expensive, is being considered, and according to the project worked out a sheltered dock with a depth of seven metres would be formed. It is understood that offers have been made to carry out the construction of this port for 30,000,000 lire.

Statistics regarding shipping at Italian ports during the month of June, 1934, show that the total goods traffic included 3,077,799 tons, this being a decrease of 90,679 tons in respect to May, 1934 (3,168,478 tons), and an increase of 499,316 tons in respect to June, 1933 (2,578,483 tons). According to the statistics in question, the Italian Mercantile Marine has participated in the traffic at Italian ports with 1,981,038 tons of goods in June, 1934 (64.4 per cent.), with 2,098,584 tons in May, 1934 (66.2 per cent.), and with 1,755,867 tons in June, 1933 (68.1 per cent.). There has been, therefore, an increase in the participation of Foreign flags, and it is stated that the British flag has occupied first place in this traffic, though there has been strong competition from the Greek and Spanish flags.

Ribble Navigation

Mr. A. H. Howarth, engineer to the Ribble Navigation, Preston, reports that the highest point in the bed of the river Ribble—which was almost invariably found near to the ⅝ mile below the dock entrance—ranged, during the first half of this year, from 3 ft. 6 ins. to 5 ft. 9 ins., which averaged 4 ft. 7⅛ ins. above sea low water. This, as compared with the latter half of last year, showed an improvement of 3¼ ins. The past exceptionally dry year had resulted in an abnormal quantity of sand and silt being deposited in the mile immediately below the dock entrance, and the bucket dredger "Walter Bibby," with attendant steam hoppers, the shore discharge pump and grab barge, had to be called in to assist in the removal of this deposit. During the period of work in this length, 438,000 tons of the deposit had been removed. Work was in progress on the extension of the south training wall, and he expressed the opinion that every yard gained in the prolongation of the wall would result in an added improvement in the direction of the line of the intended channel, which was their objective.

Members of the Preston Town Council made their annual inspection of the Ribble waterway a few days ago, when Mr. J. G. Merriweather (general superintendent) said it was very pleasing to report that trade conditions had taken a turn for the better. The total of 583,112 tons for the net register tonnage of vessels for the year, had not previously been exceeded. The number of vessels from Foreign Ports was 253. The total imports for the year (751,874) constituted a record, exceeding the previous year's total by 94,908 tons. The imports of livestock from the Irish Free State showed an increase of 18,664 animals—57,509, against 38,845 last year—and this in spite of the tariffs.

The total exports for the year were 176,100 tons, a decrease of 10,811 tons, which was entirely due to the reduced shipments of coal and coke, principally brought about by tariff impositions. There were indications that the fall had been checked, and an improvement was being noticed. The total imports and exports, 927,884 tons, increased by 84,097 tons over the previous year. Concerning the existing port equipment, he said the number of petrol and oil storage tanks was now 42, with a total capacity of 49,430 tons, or 14,829,000 gallons. In addition, there were 16 tanks used for the storage of liquid bitumen, with a capacity of 5,600 tons.

Ald. W. Lucas, chairman of the Ribble Navigation Committee, declared the past year to be one of the best they had ever had, and this year they were doing exceedingly well. The number of people employed by the Corporation on the dock estate was 359; in addition, there were 741 casual workers. During the past twelve months, directly and indirectly, the number employed had varied from 1,400 to 1,800 men weekly. The wages paid by the Corporation amounted to £135,88[illegible] yearly, and it was estimated that between £70,000 and £80,000 was paid by other employers of labour. It was safe to assume that at least 5,000 to 6,000 persons in Preston and district were dependent on the dock for their livelihood. The financial result showed that on the total amount spent, the balance of revenue approximated to 3.3 per cent., while on the debt outstanding the result was 5.7 per cent. If it had been a commercial undertaking it could easily have paid four per cent., which was better than the Manchester Ship Canal's return for the past few years. He would not be afraid to ask the Council for further capital expenditure, on the results so far obtained.

The Port of Amsterdam

The position of the Port of Amsterdam in regard to number of vessels and tonnage and to the goods traffic arrived and sailed, as compared with the corresponding figures of last year, is as follows:—

SEAGOING VESSELS AND TONNAGE.

	ARRIVALS				SAILINGS			
	No.	Per Cent.	N.R.T.	Per Cent.	No.	Per Cent.	N.R.T.	Per Cent.
June 1933 ...	287		392,119		274		380,087	
„ 1934 ...	261		345,413		280		369,813	
	−26	−9·06	−46,706	−11·91	+6	+2·19	−10,274	−2·7
May 1934 ...	295		387,614		292		406,025	
June 1934 ...	261		345,413		280		359,813	
	−34	−11·53	−42,201	−10·89	−12	−4·11	−36,212	−8·92
Jan-June 1933	1,589		2,253,690		1,588		2,283,610	
„ 1934	1,598		2,298,685		1,617		2,331.670	
	+9	+0·57	+44,995	+2·0	+29	+1·83	+48,060	+2·1

SEAGOING GOODS TRAFFIC.
(In Tons of 1000 Kilos*).

	1 Import	2 Transit incl. in col. 1	3 Export	4 Transit incl. in col. 3	5 Total col. 1 & 3
May 1933	286,205	50,914	114,731	43,797	400,936
„ 1934	298,564	48,773	125,580	51,468	424,144
	+12,359	−2,141	+10,849	+7,671	+23,208
	+4·32%	−4·21%	+9·46%	+17·51%	+5·79%
April 1934	267,507	48,196	110,130	45,237	377,637
May 1934	298,564	48,773	125,580	51,468	424,144
	+31,057	+577	+15,450	+6,231	+46,507
	+11·61%	+1·20%	+14·03%	+13·77%	+12·32%
Jan.-May 1933 ...	1,395,225	287,690	632,932	224,844	2,028,157
„ 1934 ...	1,506,245	278,586	653,538	252,918	2,159,783
	+111,020	−9,104	+20,606	+28,074	+131,626
	+8·0%	−3·16%	+3.26%	+12·49%	+6·49%

* These figures have been taken from the monthly statistics of the Central Bureau, The Hague, Holland.

Classified according to flag the number of vessels which entered the Port of Amsterdam during June, 1934, was:—

Dutch, 125; Great Britain, 56; German, 29; Swedish, 19; Norwegian, 11; Danish, 5; Greek, 1; Lettish, 2; Finnish, 3; Polish, 1; Italian, 4; Estonian, 1; Russian, 3; Panaman, 1.

Vessels laid up at Amsterdam:—1st June, 1934—18 vessels, measuring 88,690 tons gross; 1st July, 1933—30 vessels, measuring 145,621 tons gross; 1st July, 1934—20 vessels, measuring 117,793 tons gross.

White Star Line and Cunard Line at Southampton.

For the first time, vessels at Southampton Docks have been flying the house flags of two companies. It is the first outward and visible sign at the docks of the merging of the Atlantic interests of the White Star Line and the Cunard Line.

Orders were received, on July 7th, for the vessels belonging to the two Lines to hoist the house flags of both Companies.

Another indication of the merger is the issue of a list of sailings arranged on the joint service. There are seven sailings from Southampton during August in connection with the express service. Some of the departures come very close together, and at other times there are gaps of six or seven days. When the management have been able to get down to details, there will no doubt be a more uniform schedule, for there are no fewer than twenty-five ships to be considered in connection with the "manning" of the services and the maintenance of the pleasure cruises.

During the past month the "Majestic," the world's largest ship, has been in dry dock for her mid-season overhaul.

Mersey Ferry Re-arrangement.

In consequence of the opening of the Mersey Tunnel, the Birkenhead Corporation ferries become leased to the Mersey Tunnel Joint Committee for twenty-one years, at the end of which time they can again be transferred to the complete control of the Birkenhead Corporation. During the next twenty-one years, therefore, the whole of the undertaking, while being controlled by the Ferries Committee of the Birkenhead Corporation, will be financed by the Joint Committee, which will make good any financial loss, or benefit by any profit which may accrue. During the last few years the ferries have been a very profitable undertaking, and considerable sums have been allocated from the profits in relief of the town's rates. With the leasing of the undertaking these profits will cease to be so applied.

Quick Discharge Job.

A notable feat in connection with the quick discharge of steamers was completed at Garston (L.M.S.), Liverpool, a few days ago, when the cargoes of the Messrs. Elders and Fyffes' s.s. "Pacuare" and s.s. "Aracataca," comprising 145,000 bunches of bananas, were unloaded in nineteen working hours. The fruit, unloaded by machinery, was transferred direct from ship to railway vans specially designed for the conveyance of bananas. Delivery to places in the Midlands, North of England and Scotland was effected the day after despatch from Garston.

The Port of Bayonne

and other Ports in the Department of the Lower Pyrenees, France

Photo] [Baudelat

Bayonne: View from the Citadel looking South, at the confluence of the Rivers La Nive and Adour. Right-bank Quays in foreground. Left-bank Quays on further side, with Town Hall and Cathedral in distance.

I—Historical

AS early as the 13th century, under English rule, the Port of Bayonne experienced great prosperity, as proved by its furnishing a war contingent of no less than twenty ships and ten galleys.

About 1450, the mouth of the Adour having shifted towards the north, navigation became difficult and sea-borne trade was seriously affected. This situation was met by Louis de Foix. Having dug a new channel through the sand-banks and blocked the river-bed, he was able by diversion of flood water to re-establish a direct and deep entrance channel called the Boucau Neuf. This was in 1579. Subsequently, however, further movements of the river mouth, now shifting southward, gave the channel a winding and dangerous course.

Ever since those early days, the improvement of the estuary has been the Port's most vital problem.

The Bayonne Chamber of Commerce was created by a decree of the Council of State on the 15th January, 1726.

From 1730, important works were undertaken to define the passage by solid longitudinal breakwaters or guide banks, extended in successive stages, particularly on the South side, towards which the river tended to move. Their width apart, starting at 150 toises (960 ft.) upstream, was reduced to 110 toises (700 ft.) downstream, with the object of intensifying the scouring force of the ebb tide.

The extension of these banks succeeded in restraining the lateral movement of the channel, but not in appreciably increasing its depth. It was hoped to carry the mouth out into deeper water, but in fact any temporary improvement was speedily nullified by the drift of the sandy bottom which followed the advancement of the breakwaters.

At the beginning of the second empire (1852), traffic increases appreciably and the volume of imports and exports exceeds 100,000 tons per annum. An improvement in the condition of the approach to the port is regarded as essential. Napoleon III., who is in summer residence at Biarritz, calls for a fresh examination of the problem. A solution is found in 1856, which consists in extending the solid jetties already existing by means of open jetties. By this means it is hoped to secure an improvement between the jetties, without accretion of the beach, and thus enable the extension to be carried far enough into deep water. The execution of this programme is continued up to 1895.

The improvement expected is only partially accomplished; if the bar does not increase, neither does it diminish very much; the light works, constructed in a very exposed situation, are difficult to maintain; and finally, the movement of sand results in the formation between the jetties of shifting banks constituting a danger to navigation. At the end of this period the depth of water in the channel, at low water of spring tides, is sometimes as little as 1½ metres (5 feet).

In the meantime, traffic has increased and also the size of ships. In 1882, the installation of a large ironworks at Boucau brings with it a considerable addition of tonnage. It becomes an urgent necessity to press forward the improvement of the entrance.

In 1895, a new programme is adopted: the extension of the jetties is abandoned; the open jetties are converted into solid ones and, taking advantage of the improvement in dredging plant, the removal of sand and gravel tending to accumulate in the channel is undertaken.

The conversion of the jetties to solid form is carried out between 1895 and 1898. It requires completion by certain strengthening works executed progressively and still in progress at the North Jetty. Last, but not least, the Port is equipped with two suction hopper dredgers of 400 cubic-metre (520 cubic-yard) capacity. The execution of this programme marks definite progress in the improvement of the estuary: the least depth below L.W.S.T. is now nearly always between 4 and 5 metres (13-16½ ft.), only on rare occasions towards the end of the winter being reduced to about 3½ metres (11½ ft.). The channel is regarded as definitely stabilised.

From time to time other important works contribute to the establishment of the Port of Bayonne, and the improvement of its internal waterways.

1892: Construction of a graving dock.

1898: Construction of a deep-water quay wall, with vertical face, in coursed blockwork, for a length of 300 metres on the Allées Marines (Marine Way).

1906-1913. Deepening of the Casquet and Blancpignon channels and reclamation of land.

Progressive development of equipment for the handling of cargo.

Port of Bayonne—continued

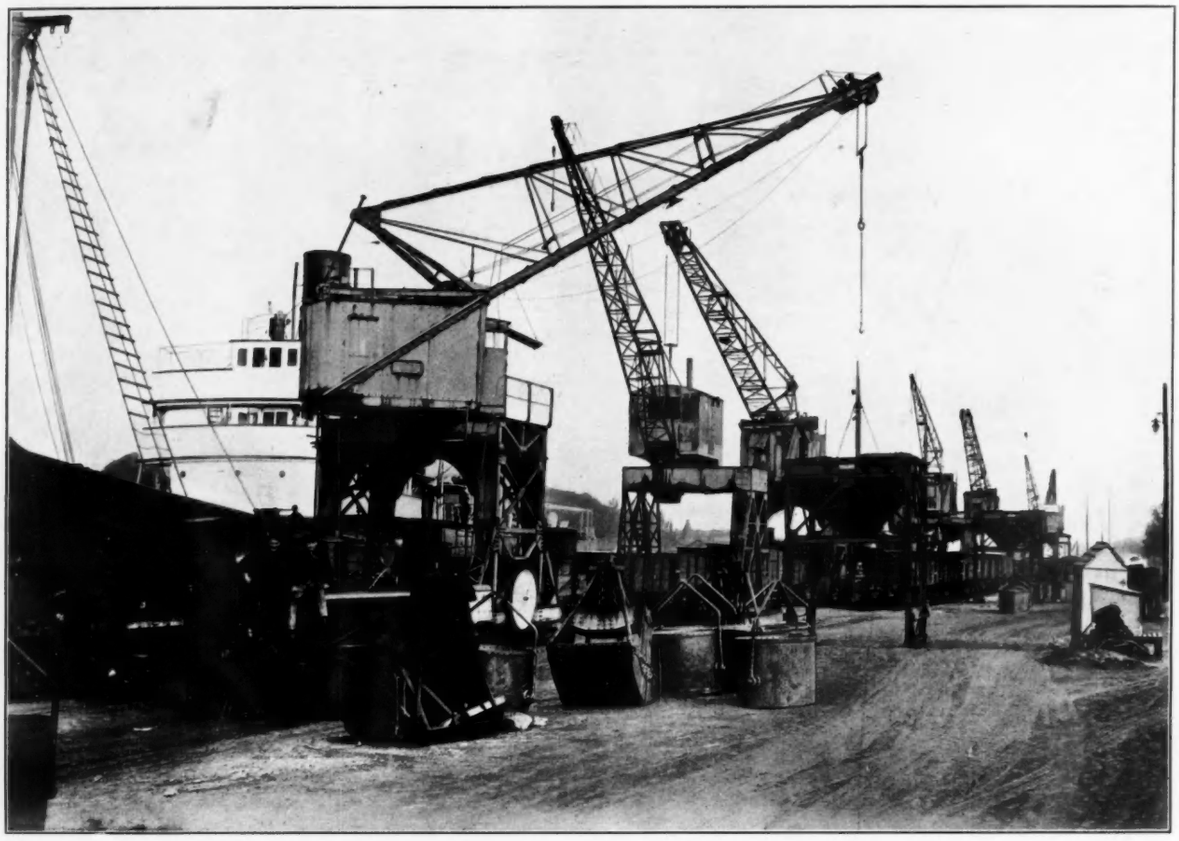
II—Constitution

Bayonne as a port is not independent of the state.

The Port Director is the Divisional Chief Engineer of the Roads and Bridges Department (" Ponts et Chaussées "), who is in charge of both marine and general works in the Lower Pyrenees and is stationed at Pau. The Bayonne Chamber of Commerce administers the handling equipment and contributes towards the cost of port improvement works out of funds derived from dues which it is authorised to levy.

Thanks to the dredging that is carried on regularly whenever the state of the sea permits, the permissible draft of vessels ranges from 6½ to 8½ metres (21 to 28 ft.) at high water, according to the tide.

The channel is constrained to a defined course; the sand banks increase or diminish, closing in or receding from the jetty heads according to the temporary preponderance either of wave action or of the river current and the artificial aid of dredging; but actually, even in late winter—which is the most unfavourable season owing to the roughness of the sea and



Cranes on the Marine Way Quay, Bayonne.

III—Present State of the Port, its Approaches, Equipment and Outlets

(1) General Description.

The Port of Bayonne, situated up the Gulf of Gascony at the mouth of the Adour, is the only commercial ocean port on the French coast south of Bordeaux.

Besides serving Bayonne itself, whose population is about 32,000, and the neighbouring town of Biarritz and others on the Basque coast, its geographical situation renders it the natural port of the whole basin of the Adour, comprising the Departments of the Upper and Lower Pyrenees and parts of the Departments of Landes and Gers, of the Upper Garonne and of Ariege.

On the Spanish side, apart from the present Customs system, the trading possibilities of the Port of Bayonne are rather limited by the necessity of double-handling which arises from the distance of the Spanish railway, coupled with the competition of the adjacent Spanish port of Pasages.

The Port includes the whole course of the Adour from Bayonne to the sea, for a length of over 6 kilometres (about 4 miles). The navigable channel throughout this length has a minimum depth of 5 metres (16½ ft.) at L.W.S.T. The range of tide varies between 1.1 and 4.2 metres, or 3½ and 13½ ft.

Maritime works bordering the river fall into three groups: entering from seaward they are, first, those of Boucau, on the right bank, immediately adjoining the river mouth; then those of Blancpignon on the left bank, midway between Bayonne and the sea; and lastly, those of Bayonne itself, on both banks, at the borders of the town.

(2) Approaches.

The entrance channel has been improved by extensive works, as already mentioned.

the enforced cessation of dredging operations—the minimum depth in the channel is not reduced to less than 3½ metres (11½ ft.) below low water datum. Dredging and the natural current speedily restore the minimum depth to 4 metres (13 ft.). The permissible draft at high water is rarely less than 6 metres (19½ ft.) even on neap tides—about 18 days in the whole year.

In fact, cargo boats of 3,000 to 5,000 tons, drawing as much as 7 metres (23 ft.), currently frequent the port.

The inner channels offer no difficulty: the depth nearly throughout is greater than 5 metres (16½ ft.) below datum, the only notable exception, constituted by the largest bank, to the right of Boucau, will be removed by the rock-breaking operations already begun.

A ship having made the entrance is able to draw alongside quay, without the aid of a tug, in less than half an hour.

(3) Accommodation and Equipment.

(a) **Length of Quays or Wharves.**

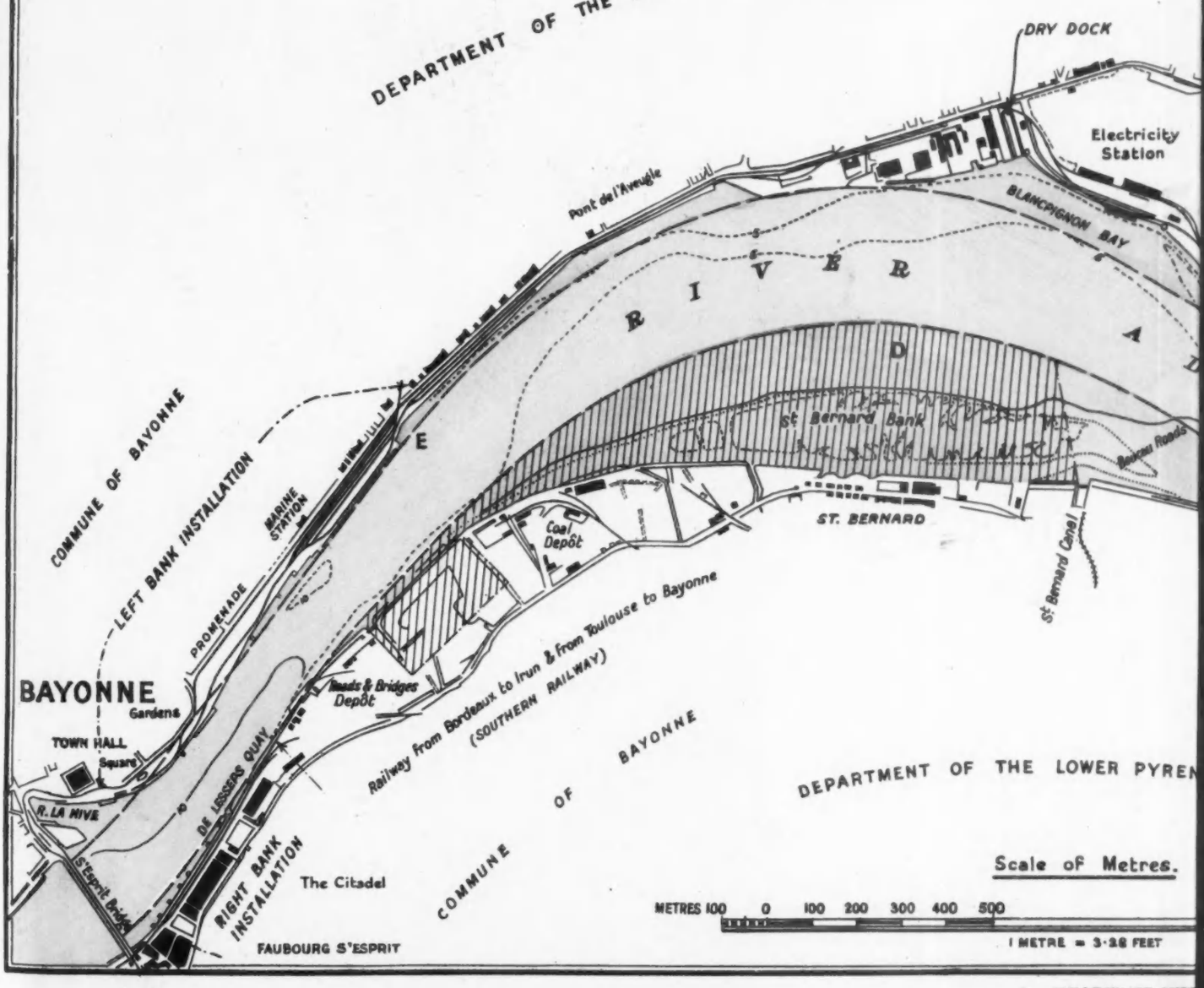
The total length of quays at which ships can berth, either directly or by means of false quays or of dolphins, amounts to 4,460 metres (2¾ miles), including 1,100 metres of private and 3,360 metres of public quays. Some of these are allotted at times to sea-going vessels and at other times to river craft, the river traffic having no special quays exclusively.

Apart from the Marine Way Quay (" quai des Allées Marines"),which is a vertical wall 300 metres (about 1,000 ft.) long, taking vessels of 7-metre (23-ft.) draft, the other berthing quays are formed by timber falsework or dolphins having an aggregate length of 1,120 metres (3,675 ft.) standing generally in front of an old masonry wall having piled foundations and pitched slopes.

PORT OF BAYONNE.

UNDER THE JURISDICTION OF THE MINISTRY OF PUBLIC WORKS, PARIS.

NOTE ;- Scheme for Proposed Training Walls shown thus — — —
Areas to be reclaimed coloured Red.
Areas to be dredged coloured Dark Blue.



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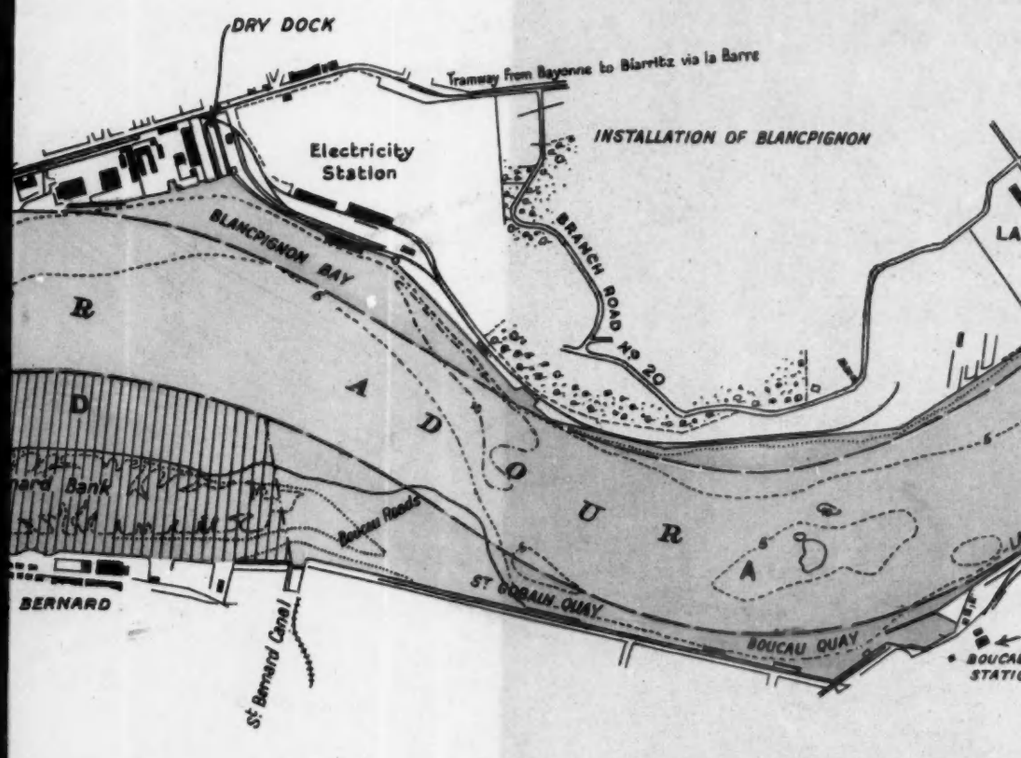


COMMUNE OF

ARTMENT OF THE LOWER PYRENEES

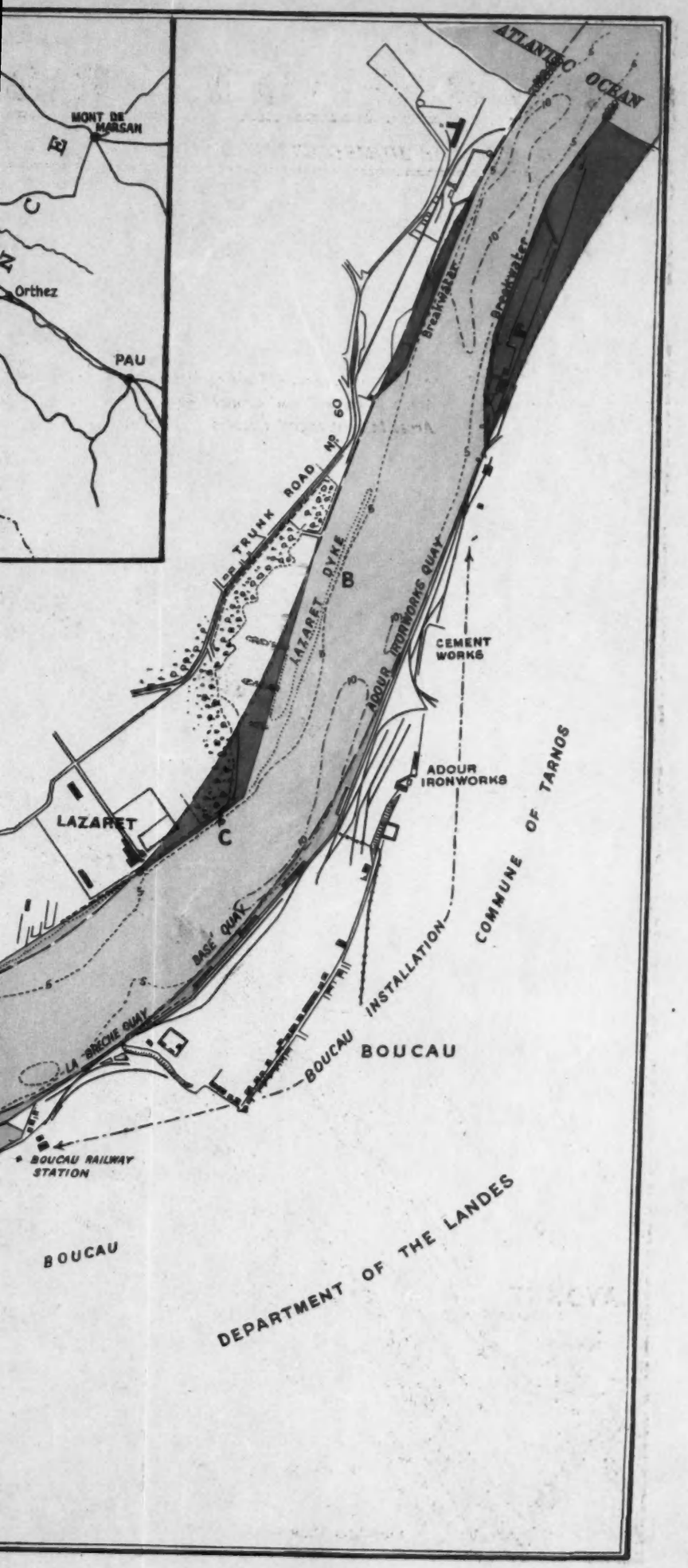
Scale of Metres.

200 300 400 500 1000 1500 METRES

1 METRE = 3·28 FEET

WARD & FENTON, LTD. MARYLEBONE

T. 1934.


MONT DE MARSAN
Orthez
PAU
ATLANTIC OCEAN
Breakwater
Breakwater
TRUNK ROAD No 60
LAZARET DYKE
ADOUR IRONWORKS QUAY
CEMENT WORKS
ADOUR IRONWORKS
LAZARET
BASE QUAY
LA BRÈCHE QUAY
BOUCAU INSTALLATION
COMMUNE OF TARNOS
BOUCAU
BOUCAU RAILWAY STATION
BOUCAU
DEPARTMENT OF THE LANDES
B
C

MAP.

PORT OF BAYONNE

UNDER THE JURISDICTION OF THE MINISTRY OF PUBLIC WORKS.

Port of Bayonne—continued

The principal quays are devoted to various classes of trade as under, viz. :—

No.	Wharf	Length	Sea Traffic		River Traffic
			In	Out	In
1	BOUCAU GROUP (right bank)	Metres			
	Forges de l'Adour ...	800	Coal, Ore	Ironwork	Limestone
	Bazé, la Brèche and Boucau	800	Coal ...	Pit Props, Timber	Building Materials and Stone
	St. Gobain ...	300	Phosphate, Pyrites ...	—	—
2	BLANCPIGNON	460	Coal ...	—	Do.
3	BAYONNE GROUP				
	Allées Marines ... (left bank)	300	Coal, Phosphate	—	—
	Place d'Armes ... (left bank)	600	General Cargo ...	General Cargo ...	Do.
	De Lesseps ... (right bank)	600	Coal, Grain	—	Do.

The wharves having the heaviest traffic are, firstly, that of the Adour Ironworks (Forges de l'Adour), with 230,000 tons in 1931, or 30 per cent. of the total; and next in order the vertical quay of the Marine Way (Allées Marines), with 196,400 tons in 1931, or 26 per cent. of the total.

The tonnage handled is almost entirely in heavy goods.

Grain is landed at the De Lesseps Wharf, for the mills of the district.

The bulk-oil installations at Bayonne are three in number, one for petroleum, another for bitumen and the third for tar.

(b) **Mechanical Handling Plant. Quay Cranes.** (There are none floating.)

Public: (38).

Steam Cranes: 25, for 1½-ton lift, 25 tons per hour; 1, for 3-ton lift, 50 tons per hour; 1, for 5-ton lift, Portable.

Electric Cranes: 4, for 1½-ton lift, 25 tons per hour; 6, for 3-ton lift, 50 tons per hour; 1, for 30-ton lift, Fixed.

Private: (12 Cranes and 2 Transporters).

Adour Ironworks: 9 steam cranes, 1½ ton; 3 electric cranes, one of 1½-ton and two of 4-ton lift; 1 transporter of 14-ton lift.

St. Gobain Company: 1 transporter of 4-ton lift.

As a recent acquisition, special mention may be made of the transporter brought into service by the Ironworks, in 1931, for the discharge, deposit in stack heap or wagon and re-lifting of coal and ore received at the works. This machine has a range of 50 metres (164 ft.) between legs. The crane, of 14-ton lifting capacity, is furnished with grabs to lift 3 cubic metres of ore or 7 of coal. It delivers either on the ground or into a hopper, of 100 cubic metres, under which wagons are drawn. The effective rate of handling coal reaches 2,000 tons per day.

Apart from this equipment, the most modern plant is that on the vertical quay at the Marine Way, capable of handling 2,400 tons per day over a length of about 1,000 ft. of frontage.

In 1931, the diminishing traffic limited this quay to a tonnage much below its capacity, being only 654 tons per lineal metre (200 tons per ft.) per year.

(c) **Sheds, Warehouses and Dumps.**

The Chamber of Commerce controls

Two Sheds, covering 3,560 square metres or 38,350 sq. ft.

One Warehouse and one General Store, covering 2,300 square metres or 24,770 sq. ft.

The sheds and stores are not very extensive, because such accommodation is not required for trade which is mainly in heavy goods.

70,000 square metres (about 18 acres) of public dumping grounds are at the disposal of the users of the port.

(d) **Facilities for Repair.**

The Chamber of Commerce has charge of a graving dock, with an effective length of 98 metres (322 ft.), situated at a curve of the left bank known as Blancpignon Bay.

(e) **Special Service.**

The Chamber of Commerce provides a towing service, as part of the port facilities, which is effected by the tug "Adour No. 3" of 650 h.p.

(4) Distribution.

A considerable proportion of the goods imported is consigned to the factories and warehouses situated in the immediate neighbourhood of the quays.

Transport by road has increased appreciably of recent years, and in 1931 amounted to 140,000 tons.

The system of inland navigation which terminates at Bayonne comprises, in the lower reaches of the Adour and its tributaries, a series of navigable waterways distinct from the main system.

The principal means of distribution continues to be the railway, either for direct reception or despatch, or for forwarding from the depots of importers.

A system of sidings, aggregating about five miles, connects the quays with the three stations of Boucau and Bayonne, on the right bank, and Bayonne Allées Marines on the left bank.

Sorting is done at the right-bank station of Bayonne.

(5) Electric Power.

Bayonne is linked up with the whole of the hydro-electric power stations in the Western Pyrenees, by the transmission lines at 150 K.V. and 60 K.V. of the Southern Company, supplemented by five lines at 60 K.V. of other companies. Inter-connection is effected at the outskirts of Bayonne by the large station of St. Pierre. Connection is also made with the steam-driven generating plant recently installed at Blancpignon in co-operation with local electrical companies.

Thus Bayonne is specially well placed for the establishment of industries requiring an ample supply of energy at a cheap rate.

IV—Extensions and Improvements

in progress or proposed, to the port, its approaches, its equipment and its means of distribution.

(1) Approaches.

Improved access is being obtained by the progressive execution of a general programme of regulation of the river bed, extending over a length of about 24 kilometres, or 14 miles.

This programme, adopted in 1930, tends to increase the hydraulic energy of the river by regulating the outlines of the banks and the depths. The increased volume of tidal water entering the Adour strengthens the favourable action of the river upon the regime of its estuary: as may be seen by reference to the plan of the port. (See Supplement).

This programme comprises, for early execution:—

(a) The reduction by rock-breaking of the Casquets bank, a rocky shallow on the right of Boucau, at (a) on plan, which constitutes an obstruction both to navigation and to tidal flow. The dredged spoil is used to begin the formation of a dyke on the St. Bernard bank.

(b) The removal of the low dyke on the left bank between Lazaret and the river mouth, at (b) on plan.

(c) The rounding of the point at Lazaret, at (c) on plan.

(2) Port Works and Equipment.

(a) **Reclamation on the St. Bernard Bank.**

This project has the double purpose of extending the area of reclaimed land available for industrial development and of realising to some extent the programme of river regulation by reducing its excessive width in this reach: see (d) on plan.

The reclamation anticipated would be particularly suitable for oil storage.

(b) **Extension of Marine Way Quay.**

This project includes on the one hand the lengthening, by 120 metres (about 400 ft.) downstream, of the vertical quay of Marine Way, at (e) on plan, and on the other hand the improvement of the railway connections, such improvement consisting in an increase in number of the quayside lines, provision of a grid for storing 200 wagons and extension of the Marine Way Station.

V—Traffic

Passenger traffic, in the sense of travelling, has always been and continues to be negligible. On the other hand, boating for pleasure is becoming more and more prevalent, as a feature of the tourist development on the Basque coast. Bayonne is regularly frequented by the finest of French and foreign yachts, for which special berths are reserved on the left bank near the town.

But it is goods traffic that continues to be the most important form of activity in the port, notwithstanding its recent falling-off in consequence of the world-wide economic depression.

Table No. 1 shews the shipping statistics for the years 1931-2-3. Table No. 2 summarises the various classes of trade in the year 1933.

Finally, the comparative table No. 3 sets out the variations in the principal classes of trade during recent years. In one column the figures are those of 1913, the year of maximum total traffic; in another the figures show the average of the three years 1928, 1929 and 1930, the latest comparatively normal post-war years, and in the last two columns are the figures for 1931 and 1933.

The trade of Bayonne has suffered a severe set-back since 1931, owing to the economic crisis. The slackening in importation of coal and phosphate, due to the reduced activity in industry, and also—in the case of coal—to administrative restrictions, are, in conjunction with the almost complete cessation of the export of pit-props to England, the most significant factors in this retrogression. This abnormal situation is

Port of Bayonne—continued

expected to right itself when the general economic depression comes to an end. As regards fresh factors in trade, such may be found, notably in the importation of petroleum products and in the renewal of industrial development in the Pyrenees, thanks to the abundance of electric energy derived from water-power.

The Port of St. Jean de Luz

The Port of St. Jean de Luz as a whole comprises the bay of St. Jean de Luz, and the small ports which give on to this bay: the Port of St. Jean proper, at the mouth of the Nivelle, and the Port of Socoa.

The bay of St. Jean de Luz, since it was enclosed by the formation of the breakwaters of Socoa, Artha and Ste. Barbe, affords the largest cargo vessels safe anchorage accessible in all weathers. It is a port of refuge, which at the same time serves the purpose of an out-port to Bayonne.

St. Jean de Luz is a very busy fishing harbour. Before the slump in the fish-canning industry, which furnishes the principal outlet for the catch, the numbers engaged amounted to 800 men, on 88 vessels, either steam or motor-driven. The annual value of the fishing varied between 14 and 20 million francs.

Improvement of this port for the benefit of the fishing interests is in course of execution. The project comprises the extension and deepening of the mooring areas and dredging the channel of the Nivelle which leads in to these moorings.

Finally, the bay of St. Jean de Luz has become in recent years a centre of attraction for pleasure yachting and, with the object of giving better facilities for this form of navigation, which has an important bearing upon the popularity of the Basque Coast with tourist and holiday-makers, a scheme is on foot for remodelling the small Port of Socoa by forming a basin of two acres in area for the accommodation of such craft.

For the information given herein, we are indebted to M. Blanchet and to M. Lesbre, Divisional Chief Engineer and District Engineer respectively of the " Ponts et Chaussées " at Pau and Bayonne, and to M. Hargous, the Engineer to the Bayonne Chamber of Commerce.

TABLE 1—MARINE TRAFFIC DURING 1931, 1932 and 1933.

1931	Inward	Outward
Number of Vessels	384	392
Registered Tonnage	270,567	280,395
Tonnage of Goods	497,664	98,963

1932	Inward	Outward
Number of Vessels	366	365
Registered Tonnage	277,310	278,519
Tonnage of Goods	457,702	63,016

1933	Inward	Outward
Number of Vessels	373	375
Registered Tonnage	292,116	291,576
Tonnage of Goods	495,597	60,998

TABLE 2—GOODS: INWARD AND OUTWARD, 1933.

Class of Goods	Inward	Outward
	Tons	Tons
Coal	339,351	926
Building Materials	3,977	2,245
Timber	—	9,117
Iron and Steelwork	2,110	29,245
Ore	63,355	—
Phosphate	31,948	—
Pyrites	7,719	—
Fertilisers	—	—
Grain	11,377	—
Wines and Spirits	3,543	106
Wool and Hides, etc.	4,939	—
Jute	854	—
Pit Props	—	10,950
Salts	—	5,328
Resins	—	665
Sundry	26,424	2,416
Total	495,597	60,998
Total (in and out) ...	556,595	

TABLE 3—PRINCIPAL KINDS OF CARGO.

IMPORTS

Goods	1913 Tons	3-year average 1928-1929-1930 Tons	1931 Tons	1933 Tons
Coal	467,974	417,523	380,268	339,351
Ore	56,914	89,440	47,275	63,355
Phosphate, &c. ...	66,732	69,073	38,739	39,667
Grain	62,754	18,976	5,183	11,377
Cement and Building Materials ...	10,962	14,369	3,896	41,847
	627	8,175	14,538	
Petroleum	37,521	7,883	7,565	
Various				
Total Imports ...	703,494	625,439	497,664	495,597

EXPORTS

Pit Props	203,295	134,281	50,308	10,950
Iron and Steelwork ...	14,587	20,814	23,260	29,245
Timber, other than Pit Props	23,756	10,200	14,372	9,117
Ore	24,448	2,888	—	—
Salts	12,337	9	—	5,328
Various	43,274	21,581	11,023	6,358
Total Exports ...	321,697	189,773	98,963	60,998

Weser Inland Shipping in May

Lack of rain led to a further decrease in the water level. From the beginning of the month cargoes had again to be limited, because the supply of water from the Eder reservoir no longer permitted the maintenance of the level of 1.20 metre in Hanover Munden, necessary for barges of one metre draft. On the Middle Weser the average draft depth in May only amounted to 1.30 metre, i.e., quarter of a metre less than in April. In May of the dry year 1929 it was 1.48 metre, or 18 centimetres more than the same month this year. May, 1934, was only three centimetres over the worst year—1921, in which year, however, the Eder reservoir could not be utilised so skilfully as now. In June the position had become still worse. On an average, from the 1st to the 19th June the draft depth on the Middle Weser only amounted to 1.15 metre, against a June average of 1.36 metre in 1933, 1.32 metre in 1929 and 1.23 metre in 1921. For some days past barges plied with only one metre draft from Minden itself, and on passing from the canal to the river Weser have had to distribute their cargoes into three different vessels. This wastage of carrying capacity and the considerable lighter expense incurred in lightening the vessels are a heavy burden on the already hard-hit Weser shipping. In May already the quantity of goods lightened was double that of the previous month. Only the canalisation of the Weser can help. The present position once more shows how urgent this is.

The retrogressive movement which commenced in goods traffic in April, has continued owing to the bad weather conditions, though fortunately not so fast as in April. 125,600 tons passed through the Bremen Weser lock in both directions in May. Compared with April, this is an increase of 14,300 tons, or 13 per cent. Compared with May, 1933, on the other hand, the quantity of goods was 2,600 tons, or 2 per cent. less. Down-stream traffic during the month under review amounted to 84,200 tons, 3,700 tons, or 4½ per cent. more than in the previous month. Coals improved slightly this time, whereas potash salts decreased. Up-stream goods increased by 10,600 tons, or 30 per cent., to 41,400 tons. The increase falls to timber, imported coals, phosphate, grain and flour. Furthermore, rice was carried. Only piece-goods showed a decrease. Compared with May, 1933, the amount loaded down-stream was 3,300 tons, or 4 per cent. less; up-stream, on the other hand, 700 tons, or 2 per cent. more. Among other things, Ruhr coal decreased.

During the months January-May, 1934, altogether 636,300 tons passed through the lock in both directions. In the same period of the previous year the total was 527,200 tons, so that 109,100 tons, or 21 per cent., more were carried. This development is due only to the increase in the first quarter, which amounted to 40 per cent., which then, however, decreased to 28 per cent. in April, and further to 21 per cent.

North-East Coast Notes

Important Tyne Development.

ALTHOUGH June and July are probably the quietest months in the year in this area, there are not wanting signs that the general outlook is in the main satisfactory and, what is always good, is to realise that there is faith in the future. This found striking expression at the meeting of the Tyne Improvement Commission on June 19th when an important announcement was made by the vice-chairman, Sir Arthur M. Sutherland. It was in the form of a proposal from a special committee to build a new coal staith at Hebburn to deal with coal from the Durham coalfield.

A notable feature of the proposal, which was agreed to, is that Messrs. John Bowes and Partners, who will have preferential right of use will guarantee the shipment of a million tons of coal per annum. Sir Arthur Sutherland said the colliery company had found their existing staiths inadequate for modern needs, and had asked the Commissioners to help them. The Commission agreed, and the proposal was to build a staith 1,300 ft. in length with a depth of 25 ft. at low water and 40 ft. at high water, which could be increased to 30 ft. and 45 ft. respectively. There would be three loading points, each capable of shipping 500 tons per hour, and the staith would be equipped with radial towers, anti-coal breakers, and all modern loading plant. The company would pay for a minimum of a million tons per annum and were prepared to enter into an agreement for fifty years. It was a matter of great satisfaction, he said, that the Commissioners and the collieries on the river were so readily able to come to arrangements on developments of that kind which might mean so much to trade in the future. Collieries had spent thousands of pounds in grading and cleaning coal and it was the work of the Commission to help in every possible manner so that the coal might be shipped in the best condition.

The report was adopted on being seconded by Mr. R. S. Dalgleish, and Sir Arthur Sutherland said: " You will have the satisfaction of knowing that the work will be put in hand at once and diminish unemployment."

Sir George Lunn said that as one who had had nothing to do with the scheme he wished to congratulate the committee which had carried out the work. The day of shipping coal at 18 ft. of water was gone, and gone for ever. Modern tonnage needed more water, and by getting berths of the type proposed they would get ships to Hebburn which otherwise could never have gone there. This was just the sort of co-operative re-organisation of the coal trade which had been clamoured for and was needed.

Description of New Staith.

The site of the new staith is on the south bank of the Tyne extending westward from Messrs. Foster, Blackett and Wilson's lead works and will occupy the frontage of the staiths formerly used by Wallsend and Hebburn Coal Co., Ltd., and the eastern half of the shipyard constructed by Messrs. Renwick and Dalgleish, the distance from the harbour entrance being about 5¼ miles. The new plant will consist of three radial shipping towers, two at the east berth, and one at the west berth, fed by belt conveyors extending from the teeming hoppers into which incoming waggons discharge at the termination of the proposed railway sidings. Full waggons will gravitate from the existing Jarrow and Pontop Railway over the proposed standing sidings to the waggon discharging hoppers, and empty waggons will be lifted on to the deck of an elevated gantry to gravitate thence into the empty sidings. The coal will be carried from the hoppers to vessels being loaded on rubber and canvas belt conveyors. Each shipper with its associated conveyors will be capable of loading 500 tons of coal per hour at a belt speed of 350 ft. per minute. The shippers will be pivoted at the landward end, and will have a radial travel of about 120 ft. at their riverward end, thus being able to command two or more hatches in a vessel alongside without movement of the vessel. In designing the staith all possible precautions have been taken to prevent breakage and power-driven anti-breakers of the " Handcock " type are to be provided at each loading tower for lowering coal into the holds of vessels. The whole plant will be electrically operated, each set of conveyors being under the control of the driver at each shipping point situated in a cabin high up on the river-side of each tower, from which he can see into the ship being loaded. The work has been designed by the Commissioners Engineer-in-Chief, Mr. R. F. Hindmarsh, M.Inst.C.E.

Faith in the Future.

The new staiths will eventually be capable of accommodating vessels up to 10,000 tons, and one of the officials of Messrs. Bowes and Partners discussing the scheme said they had faith in the future of the coal trade as was shown by their guarantee to the Tyne Commission. He went on to say that previously most of the coal shipped by the Company from the Tyne has been coastwise. The old staiths at Jarrow had not been capable of taking the big tramp steamer of 6,000 tons and upwards. " There are growing markets for coal, particularly in the West Indies. It is not economic for a firm to send a small shipment such a long distance but when the new staiths are completed, it will mean that we shall be able to compete in new foreign markets, and, we hope, with success."

Increasing Coal Shipments.

Meanwhile it is revealed that coal and coke shipments from Tyne in May were 1,200,755 tons, compared with 985,290 tons in May, 1933, an increase of 215,465 tons. In the past five months the aggregate was 5,941,060 tons against 5,208,870 tons, an increase of 732,190 tons, or 14 per cent. Bunkers shipped this year totalled 719,685 tons, compared with 637,710 tons last year—an increase of 81,975 tons. The quantity of oil fuel bunkers shipped from the Tyne was 11,037 tons against 5,287 tons, an increase of 5,750 tons.

At Blyth the quantity of coal shipped in May totalled 521,598 tons, compared with 451,478 tons in May last year, an increase of 70,120 tons, while during the five months, 2,631,275 tons were shipped against 2,246,190 tons, an increase of 385,085 tons.

Coal shipments from Sunderland for the first four months of the year have increased by 19,740 tons compared with the corresponding period of 1933.

Death of Tees-side Notable.

One of the best-known and most authoritative personalities connected with harbour work on the North-East Coast passed away in June in the person of Mr. John H. Amos at the advanced age of 84. All his business career had been associated with local trade and almost to the end he was acting in a consultative capacity to the Tees Conservancy Commission. Mr. Amos was born and educated in Newcastle, and commenced his work with the North-Eastern Railway Co., later joining the Newcastle Corporation, where he served in various capacities, but it was on the Teeside that his real life's work was done, being first secretary and manager and later general manager to the Conservancy during which time he took a prominent part in the reclamation schemes and development of the North Bank of the Tees.

* * * *

By the death of Mr. James B. Clark in the latter part of June a link in Tyneside business circles was broken. Mr. Clark had been associated with the Newcastle Quayside for 50 years, being for a considerable time principal of the firm of Messrs. Mackenzie, Pyhlson and Co., coal exporters. He was formerly Consul to the Netherlands in Newcastle.

Tees to be Surveyed.

It was announced at a meeting of the River Tees Conservancy Commission, at the beginning of July, that a survey of the Tees from source to estuary had been begun by the Commissioner's engineer, and it was expected that valuable results would follow. A deputation from the Middlesbro' and District Association of Chartered Shipbrokers has met the general manager, the engineer, and the harbour master, for a discussion of questions relating to mooring facilities on the river and certain recommendations submitted are being considered officially. Mr. F. T. Nattrass, the general manager, stated that arrangements had been made for an inspection of the river by directors of the London and North Eastern Railway Co., on September 25th.

Bombay Port Trust.

At a Meeting of the Trustees of the Port of Bombay held on 19th June, 1934, the following were the main items of business disposed of:—

A Government Notification was recorded appointing Mr. F. J. D. F. Karaka to be a member of the Board of Trustees during the absence on leave of Mr. M. Slade, I.C.S.

Leave of absence from the meetings of the Board for two months was granted to Major-General H. Needham, C.B., C.M.G., D.S.O.

Subject to the sanction of Government, the Board approved of the reduction of the docks wharfage rates on cotton waste from 9 annas to 8 annas per bale under the foreign schedule, and from Rs.1-11-0 per ton to Rs.0-14-0 per ton under the West Coast Schedule.

A supplemental lease of an additional area of 466 square yards at Wadala for iron rolling and smelting mills was granted.

Near Eastern Port Matters

SHIPPING at Greek ports during the month of January, 1934, included the arrival of 228 ships, representing 386,246 n.r.t., against 252 ships and 401,671 n.r.t. arrived during the corresponding period of 1933, and the clearance of 183 ships, representing 328,495 n.r.t., as compared with 192 ships, representing 346,290 n.r.t. cleared during January, 1933. There has been a slight decrease in Greek shipping, due particularly to smaller arrivals from the United States of America, Egypt and Turkey. The decrease in arrivals from the United States of America has been caused by the reduction of wheat imports, while the decrease in arrivals from Turkey has been caused by the smaller imports of coal from Zunguldak. The position of the various countries in shipping at Greek ports is as follows:—

	ARRIVALS				CLEARANCES			
	1934		1933		1934		1933	
	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.
America...	1	3,677	2	7,160	4	14,190	3	11,475
Britain ...	12	40,967	19	24,713	10	14,232	12	14,659
Holland...	3	7,574	5	5,800	2	3,282	4	4,687
France ...	4	16,257	6	17,982	4	16,257	5	17,309
Germany	7	10,728	9	15,546	9	16,865	11	21,019
Greece ...	71	53,632	60	51,502	34	17,452	30	28,277
Italy ...	81	172,615	87	189,324	76	175,657	82	181,329
Roumania	15	22,675	12	19,530	16	21,435	11	16,434

The only countries which have shown an increase in arrivals at Greek ports have been Britain, Holland and Roumania. The increase by Britain is due to British liners calling at Greek ports on pleasure cruises. The most interesting feature in the clearances from Greek ports is represented by the increase of America and Roumania.

The first place among Greek ports has been maintained during January, 1934, by the Port of Pireaus, where shipping included the arrival of 141 ships, representing 275,851 n.r.t., against 133 ships and 272,825 n.r.t. during the corresponding period of 1933, and the clearance of 91 ships, representing 170,455 n.r.t., against 84 ships and 185,283 n.r.t. There has been a slight increase in arrivals, while departures have decreased. The position of the various countries at the Port of Pireaus may be summarized as follows:—

	ARRIVALS				CLEARANCES			
	1934		1933		1934		1933	
PIREAUS	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.
America...	1	3,677	2	7,160	1	3,613	—	—
Britain ...	7	35,980	8	13,598	—	—	—	—
Holland...	1	4,235	1	370	—	—	1	1,008
France ...	4	16,257	6	17,982	4	16,257	5	17,309
Germany	4	4,771	5	8,628	1	1,531	3	11,138
Greece ...	42	44,854	27	33,961	20	11,717	9	12,471
Italy ...	49	104,786	50	123,944	41	84,142	42	94,000
Roumania	12	20,506	9	16,694	11	18,600	8	14,268

Britain occupies second place in shipping at Pireaus, Italy occupying first place. As far as arrivals are concerned, there has been an increase in the activities of Britain, Holland and Roumania. In connection with the departures from Pireaus, the only country which has shown an improvement has been Roumania. The Greek Government is following with interest the growing importance of the passenger trade at Pireaus, and the possibility of building a maritime passenger landing stage at Phaleron Bay, East of Pireaus, is being considered. In certain quarters it is stated that the same results, with less expense could be had, by using one of the quays in the Free Zone of the Port of Pireaus for this purpose. However, it does not appear that large liners like the "Aquitania" and the "Conte di Savoia" could anchor alongside in the Port of Pireaus, as the port is too narrow for the entrance of a liner of 40,000 gross tons.

Patras occupies second place among the Greek ports as before, and according to statistics which have been published, shipping at that port during the month of January, 1934, included the arrival of 16 ships, representing 40,462 n.r.t., against 16 ships, representing 35,175 n.r.t. during January, 1933, and the clearance of 17 ships, representing 64,257 n.r.t., against 14 ships and 48,411 n.r.t. There has been a larger increase in departures than in arrivals, due particularly to the progress in exports of Greek products from the Port of Patras, and to the larger number of passenger liners calling at that port. The position of the various countries in the Port of Patras is as follows:—

	ARRIVALS				CLEARANCES			
	1934		1933		1934		1933	
PATRAS	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.
America...	—	—	—	—	1	3,676	1	4,122
Britain ...	1	1,437	3	3,783	3	3 722	—	—
Holland...	1	1,509	1	1,561	1	1.561	—	—
France ...	—	—	—	—	—	—	—	—
Germany	2	4,964	1	907	2	2,348	3	3,024
Greece ...	1	1,230	—	—	—	—	1	730
Italy ...	8	30,207	6	20,587	9	51,858	8	39,397
Roumania	—	—	—	—	—	-	—	—

There has been an improvement in the arrival of German ships, due to a larger activity of the Deutsche Levant Linie un Orient Dienst between the North Sea German ports and Patras. The increased activity of Italy is the result of the decision of the Cosulich Line to have the motor liners "Saturnia" and "Vulcania" of the North America service, and the motor liners "Neptunia" and "Oceania" of the South American service calling regularly at Patras more than to general traffic.

The Port of Salonika follows, and the harbour authorities there are endeavouring to obtain a foreign loan to enlarge the port, and negotiations are going on with American, Dutch, French and Italian firms, but up to the present nothing has been settled, as engineers are investigating the situation on the spot. Shipping at Salonika, during January, 1934, included 11 ships, representing 15,804 n.r.t., against 16 ships and 21,592 n.r.t. during the corresponding period of 1933, and the clearance of 13 ships, representing 16,177 n.r.t., against 14 ships and 22,580 n.r.t. The depression in shipping at Salonika has continued during the first month of 1934. The following figures show the position of the various countries at the Port of Salonika during the period under review:—

	ARRIVALS				CLEARANCES			
	1934		1933		1934		1933	
SALONIKA	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.
America...	—		—	—	1	3,676	1	3,677
Britain ...	1	812	5	5,572	4	6,745	2	2,752
Holland ...	—	—	1	1,031	—	—	—	—
France ...	—	—	—	—	—	—	—	—
Germany	—	—	1	919	1	725	—	—
Greece ...	3	2,853	1	2,710	2	931	1	2,510
Italy ...	—	—	—	—	2	5,928	1	3,731
Roumania	3	2,168	2	1,385	2	1,385	2	1,385

With the exception of Roumania, as far as arrivals are concerned, and Britain as far as clearances are concerned, all other countries trading in the Port of Salonika have shown decreases during the month of January, 1934.

Traffic at the smaller Greek ports during the month of January, 1934, is shown below:—

	ARRIVALS				CLEARANCES			
	1934		1933		1934		1933	
	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.	No.	N.R.T.
Volos ...	4	3,813	2	6,800	6	10,281	3	5,901
Heraclion	5	5,697	5	5,798	5	6,389	6	7,753
Calamata	2	2,301	6	4,309	5	6,871	7	6,879
Corfu ...	18	15,930	19	16,889	16	13,980	17	16,208
Mytilene	9	8,525	6	8,098	7	8,698	8	12,730

According to information received from Beyrouth it appears that, in spite of the creation of the Free Zone, the situation of shipping has not improved, and that there has been a decrease both in goods unloaded and goods loaded during the first three months of 1934, compared with the corresponding period of 1933. It is felt that one of the reasons for the depression in shipping at Beyrouth is due to the lack of sufficient harbour facilities, and this explains why the Syrian Government has decided to extend by 500 metres the length of the existing breakwater, and to build 800 metres of new quayage with a depth of 12 metres so as to enable large liners to enter the port. An area of 170,000 square metres will be obtained from the construction of the quays in question, and new sheds will be erected on the quays. The cost of these works has been estimated at about 50,000,000 French francs, and this amount has already been placed at the disposal of the Syrian Government. The new Port of Beyrouth is to be completed by 1939.

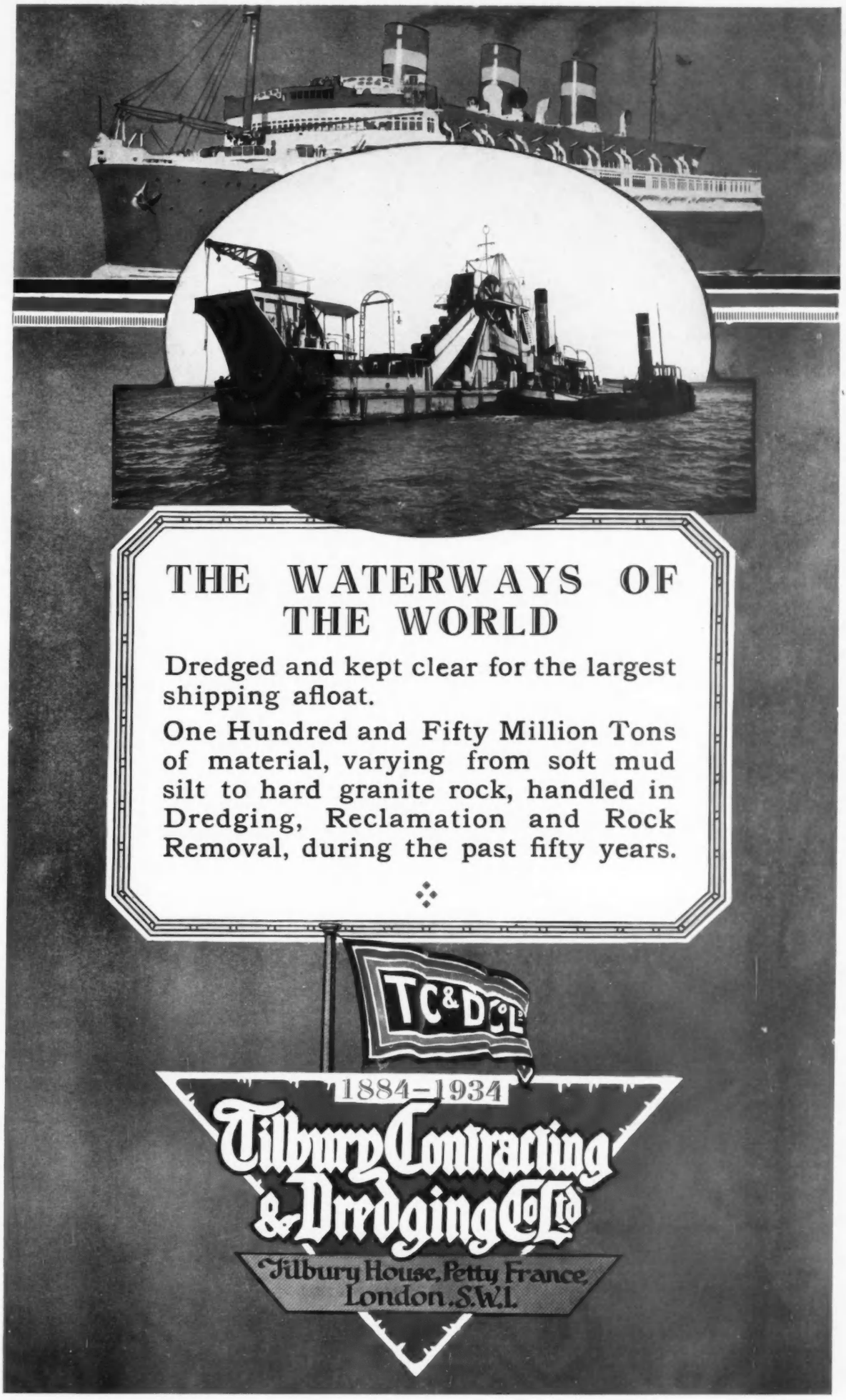
Regarding the Turkish ports, the goods exported from Izmir (Smyrna) during the first quarter of 1934, compared with the corresponding period of 1933, are as follows:—

	1933	1934
	January-March	
	Tons	Tons
Italy	5,156	9,607
Germany...	6,704	7,433
Holland	6,056	6,713
United States	2,869	5,297
Great Britain	3,659	4,713
Belgium	1,763	2,071
France	1,589	1,334
Malta	1,064	1,159

The total exports from the Port of Smyrna reached about 27,000 tons during the first three months of 1934, against 41,000 tons during the corresponding period of 1933.

Poole Harbour.

Owing to the increased trade at Poole Harbour, and the prosperous condition of the harbour, the Poole Harbour Commissioners have from the 3rd July, reduced their cargo and boomage dues by 12½ per cent.


THE WATERWAYS OF THE WORLD
Dredged and kept clear for the largest shipping afloat.
One Hundred and Fifty Million Tons of material, varying from soft mud silt to hard granite rock, handled in Dredging, Reclamation and Rock Removal, during the past fifty years.
T.C.&D.Co.
1884–1934
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CRANES FOR ALL PURPOSES

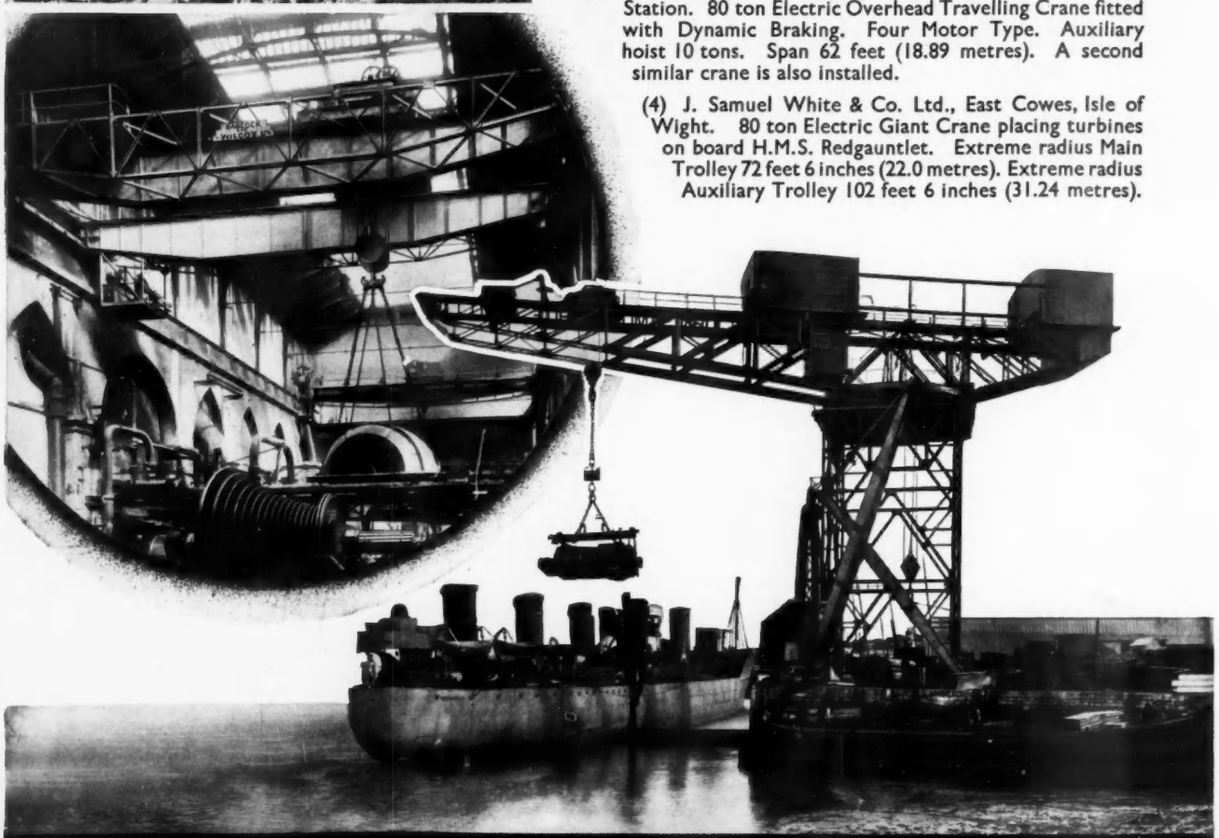
The Babcock Level Luffing Jib Crane is so prominently seen that it sometimes happens that the name "Babcock" is associated with that type of crane only. The illustrations reproduced on this page give typical examples of other "Babcock" cranes. From top to bottom they are :—

(1) FIUME DOCK. 100 ton Electric Travelling Goliath Crane, fitted with two independent crabs. Span 66.8 metres (219 feet 2 inches).

(2) South Indian Railway. Trichinopoly Workshops. 2 ton Electric Underhung Jib Crane to operate bottom opening skips for charging cupolas, and also to operate electric magnet. Radius 11 feet (3.35 metres) span 55 feet (16.76 metres).

(3) London Power Company Ltd. Deptford East Power Station. 80 ton Electric Overhead Travelling Crane fitted with Dynamic Braking. Four Motor Type. Auxiliary hoist 10 tons. Span 62 feet (18.89 metres). A second similar crane is also installed.

(4) J. Samuel White & Co. Ltd., East Cowes, Isle of Wight. 80 ton Electric Giant Crane placing turbines on board H.M.S. Redgauntlet. Extreme radius Main Trolley 72 feet 6 inches (22.0 metres). Extreme radius Auxiliary Trolley 102 feet 6 inches (31.24 metres).



BABCOCK & WILCOX LTD.

BABCOCK HOUSE, FARRINGDON STREET, LONDON, E.C.4. PHONE: CENTRAL 3282

Rylad

KOUKOKUSHA NI OTEGAMI ONSASHIDASHI NO SAIWA DOZC "DOCK AND HARBOUR AUTHORITY" NITE GORAN NO MUNE ONKAKISOE NEGAIMASU.

The Port of Workington, Cumberland

One of the two Coal Conveyors, showing the Anti-Breakage Device in position at end of belt.

THE Port of Workington is situated at the mouth of the River Derwent on the East shore of the Solway Firth and has direct access therefrom. The Port consists of the old Tidal Harbour and Dock and the new Prince of Wales Dock.

Tidal Harbour and Dock.

The Tidal Harbour and Dock has a quay frontage of 2,800 ft. and is used principally for the smaller class of vessels frequenting the Port. There are five steam cranes available with ample siding and rail accommodation.

Bridge over the River connecting the Works and Collieries, etc., on the North and South sides thereof with the new Prince of Wales' Dock.

Prince of Wales Dock.

The Prince of Wales Dock was opened by His Royal Highness the Prince of Wales on the 30th June, 1927, and can accommodate vessels up to 500 ft. long and 65 ft. beam. The entrance is 70 ft. wide with a depth of 23 ft. 6 ins. on neap tides and 33 ft. 6 ins. on spring tides. There are six powerful electric cranes each capable of dealing with 800 tons of ore and 500 tons of steel rails per day respectively. There is also a 15-ton steam crane for shipment of pig iron, etc. There are two electrically-operated belt conveyors capable of shipping 800 tons to 1,000 tons of coal per hour.

The Harbour and Dock have direct connection with the principal railways. The Swing Bridge over the River Derwent and Tidal Harbour affords access to the Steel Works, Collieries, etc., of the United Steel Companies, Limited, Workington, by means of their private railways.

Towage.

There are two steam tugs of 350 and 1,200 h.p. respectively available for use if required.

Traffic.

The Port enjoys a considerable and increasing trade in the importation of timber, ore, and general goods, and the export of coal, iron, steel, etc.

The traffic figures for the year ended June 30th, 1934, show that 755 vessels of a total net registered tonnage of 208,489 used the Port. The imports, which were mainly composed of foreign ore, totalled 218,489 tons, and exports amounted to 262,025 tons, of which coal accounted for 190,175 tons and iron and steel 60,114 tons, the balance of 11,736 tons being made up of various classes of material.

Local Industries.

In close proximity to the Prince of Wales Dock are situated Iron and Steel Works, Collieries, Ore Mines and other important industries.

Sites for Works.

There are several attractive sites for works close to the dock served with very good railway facilities, fresh water and electric power.

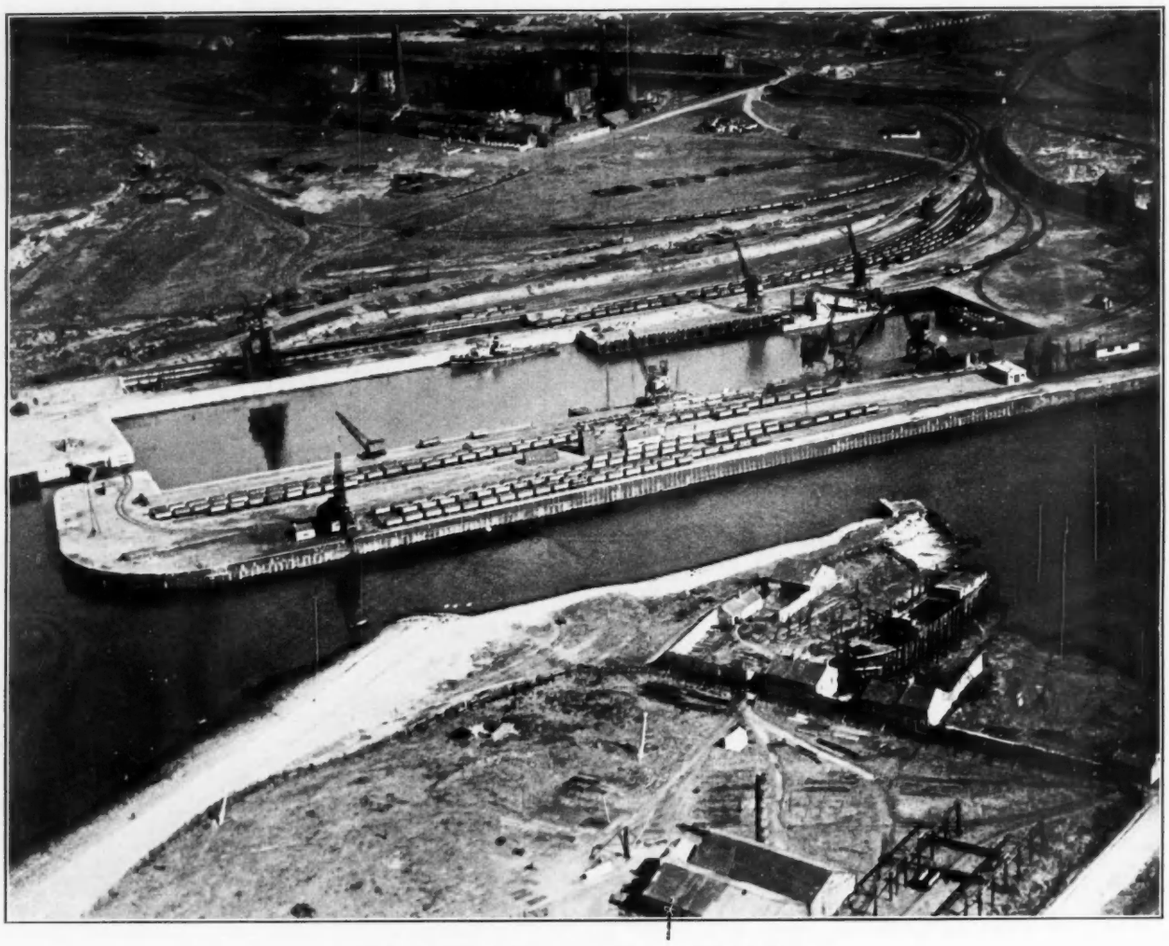
Train Service.

Express passenger and freight trains are in operation for the prompt distribution of traffic to and from all parts of the country.

Although the improved facilities have only been in operation since 1927, the Port has already earned a very high reputation for the rapid despatch given to coasting and foreign vessels.

The close proximity to this Port of many important industries and the comprehensive scheme of improvement carried out in connection with the new deep water dock justify the claim that Workington is the natural gateway to and from Industrial North-west England.

The Port of Workington, Cumberland



Aerial View of the new Prince of Wales' Dock.

The new Prince of Wales' Dock, with several large Ore-laden Steamers therein.

Notes of the Month

Ribble Dock Revenue.

The Ribble Dock revenue for the two months ended May, amounted to £38,607, compared with £31,377 for 1933, and £27,508 for 1932. The contract for the erection of new dock offices has been let to Messrs. A. Threlfall, of Leyland, for the sum of £21,617.

Fish Dock Proposal.

Sir Thomas White, chairman of the Liverpool Employment Committee, is to interview the Mersey Docks and Harbour Board and other interests, with the object of furthering the project for a fish dock for Liverpool.

Balbriggan Harbour Improvement.

At a meeting of the Dublin Port and Docks Board, Mr. T. F. Laurie, Chairman, stated, following an inspection by members of the Board, it had been decided to send down a dredger on the roads round the harbour.

The Lord Mayor said that the road approaches to the harbour were in a very bad condition, and he thought that £5,000 or £6,000 could be well expended on them.

The Chairman said that the Balbriggan Town Commissioners had applied to the Minister for Finance for a grant to assist in improving the approaches to the harbour, and giving relief to local unemployed.

Visit of French Engineers to Leith Docks.

On 28th June, a party of French civil engineers, to the number of about thirty, visited the docks at Leith.

The visitors, who were chief engineers of the Department of Ponts et Chaussées, the Mines, Electric and Hydraulic Power and the Railways, inspected the coaling appliances, electrically-operated hydraulic pumping station, pneumatic grain discharging plants and grain warehouses, under the guidance of Messrs. A. H. Roberts, and J. D. Easton, MM. Inst. C.E., with members of their staff.

Quick Unloading at Antwerp.

A record for unloading at the Port of Antwerp occurred recently when the " Langleecrag " arrived with a cargo of 8,900 tons of wheat from Montreal. The vessel commenced discharging her cargo at 1 p.m., on June 15th, with six elevators at work and unloading for the day finished at 5 p.m., when 3,600 tons had been discharged. On the following day work commenced at 8 a.m. with seven elevators at work, and the remaining 5,300 tons were discharged by 3 p.m. that afternoon, the vessel sailing at 9.30 p.m. on the same day, having only been in port thirty-six hours. This record discharge only occupied ten hours actual working time, and thus gave an average discharge of nearly 900 tons per hour.

Bombay Port Trust.

At a meeting of the Trustees of the Port of Bombay held on 3rd July, 1934, the following were the main items of business disposed of:—

Amendments of the Docks and Bunders Scales of Rates were approved, subject to the sanction of Government, to provide for a reduction of 50 per cent. in the wharfage rates on methylated spirits.

An expenditure estimated at Rs. 6,740 was sanctioned against budget provision for filling and surfacing an area of about 2,470 sq. yards to be utilised for laying the approach railway sidings for a plot north of the Western India Oil Co.'s petrol installation to make a site available for an additional petrol installation.

The Board approved a draft representation to Government protesting against the proposal to amend the rules, framed under the Indian Petroleum Act, so as to allow importation of petroleum into British India via Port Okha.

Vickers, Ltd.

The following Interim Dividends for the half year ended 30th June, 1934, will be paid to the Holders of the Preferred Stock and Preference Shares of the Company, who are registered in the books of the Company on Monday, the 6th August, 1934:—

- 2½ per cent. (less Income Tax) on the Preferred 5 per cent. Stock.
- 2½ per cent. (less Income Tax) on the 5 per cent. Preference Shares.
- 2½ per cent. (free of Income Tax) on the Cumulative Preference Shares.

Payment will be made on Friday, the 24th August, 1934.

The Registers of Members relating to these issues will be closed from Tuesday, the 7th, to Saturday, the 11th August, 1934, inclusive.

Morecambe Old Harbour.

Morecambe Borough Surveyor has been instructed to obtain details of alternative schemes of improvement and development of the wooden jetty at the Old Harbour.

Mersey Dock Board.

Mr. James L. Ferguson, a director of Lever Bros., has been appointed as a nominee member of the Mersey Docks and Harbour Board, at the request of the Minister of Transport, in place of the late Sir Max Muspratt.

Big Increase in Passenger Traffic at Southampton.

A big advance in passenger traffic was a feature of the June statistics for Southampton Docks. During the month there was an increase of over 5,000 travellers, as compared with the corresponding month last year. The inward total increased from 29,045 to 30,904, an advance of 1,859, while the outward figure rose from 24,496 to 27,875, an increase of 3,379.

The month's returns were generally highly satisfactory, for in addition to the increased passenger traffic there was an aggregate increase in the volume of cargo handled. Imports mounted from 51,720 tons to 54,609 tons, and exports from 32,265 tons to 32,291 tons.

It is a long time since an increase has been recorded in the number of vessels handled in the docks during any particular month. June proved an exception to what has lately been the rule. The total of inward vessels remained stationary at 305, but outward there was an increase of 11 ships, the figure rising from 312 a year ago to 323.

The tonnage returns afford some curious comparisons, for while the gross figures show a big decrease inward and a small increase outward the net figures are down in both instances.

The gross tonnage inward amounted to 1,568,334 tons, as compared with 1,812,351 tons in June, 1933, and outward to 1,845,056 tons, as against 1,823,240 tons, giving a decrease of 244,017 tons inward and an increase of 21,816 tons outward. The net tonnage figures show a fall of 131,644 tons inward and 5,114 tons outward, the respective totals being 808,225 tons inward and 942,852 tons outward.

Port of Liverpool.

Mersey Docks and Harbour Board reports that the number and tonnage of vessels paying rates, inwards or outwards, during the twelve months ended 1st July, were 17,499 of 19,969,354 net register tons, an increase of 425 ships and 1,210,515 tons, as compared with the year ended 1st July, 1933. To arrive at the total tonnage which entered and left the Mersey, it is necessary to double the figures. The approximate total tonnage for the year just ended would, therefore, be 39,938,708 tons, as compared with 37,517,678 tons a year ago and 38,161,456 tons in 1932. The weight of the goods discharged and/or loaded in the Board's docks for the year 1934 was approximately 13,230,000 tons, as compared with 12,300,000 tons last year.

The total of rates and dues on both vessels and goods was £2,459,969, an increase of £145,827. The following details show how these totals are composed, the figures for 1933 being given in parenthesis throughout:—Paying dock tonnage rates were 3,788 vessels of 12,707,903 tons foreign (3,502 of 11,794,434 tons), and 8,212 vessels of 2,476,785 tons coastwise (8,135 of 2,382,909 tons), making a total of 12,000 vessels of 15,184,688 tons (11,637 of 14,177,343 tons). Paying harbour rates only were 1,632 vessels of 3,557,935 tons foreign (1,487 of 3,307,272 tons), and 3,867 vessels of 1,226,731 tons coastwise (3,950 of 1,274,224 tons), making a total of 5,499 vessels of 4,784,666 tons (5,437 of 4,581,496 tons). Adding the above totals, the grand total is reached of 17,499 ships of 19,969,354 tons (17,074 of 18,758,839 tons).

With regard to rates received on vessels, dock tonnage rates were £1,306,904 foreign (£1,221,573) and £77,323 coastwise (£75,490); harbour rates only were £49,749 foreign (£46,690) and £6,428 coastwise (£6,733). Including receipts on conservancy account of £254,770 (£237,202), the total tonnage and harbour rates were £1,440,404 (£1,350,486). Adding graving dock rates £36,094 (£29,869) and dock rent £17,459 (£23,777), the total rates on vessels were £1,493,957 (£1,404,132). On goods, dock rates were £458,328 foreign inwards (£431,706), £80,029 foreign outwards (£74,547) and £62 coastwise inwards (£59), making a total of £538,419 (£506,312).

Town dues were £321,461 foreign inwards (£306,554), £85,691 foreign outwards (£79,079) and £20,441 coastwise inwards (£18,065), making a total of £427,593 (£403,698). Since 1st April, 1929, outward coastwise town dues have not been charged on goods exported coastwise. The total rates and dues on goods were, therefore, £966,012 (£910,010), and adding the rates on vessels, the grand total is reached of £2,459,969 (£2,314,142).

News from all Quarters

Norway

The foreign traffic through the Port of Oslo for the first quarter of 1934 amounted to 712 incoming ships with 667,433 n.r.t. and 703 outgoing ships with 654,903 n.r.t. The total quantity of goods exported during this period was 101,720 tons.

The extension of the harbour of Oslo is being carried out, and among the most important items to be completed in 1933 were the new wooden bridge at Hjortneshavn and the construction of new walls at the Brandskjar Quay, where work has already been started on the construction of a new storage tank for gravel. At the Tyveholm Quay, the gravel foundation for the projected new West Quay has been laid over a distance of about 230 yds. The work on the building of two new quay bridges at Piperviken is being carried out. Pile-driving and concreting has been started for the construction of the new East Quay (Quay C) and blasting is being done at the West Quay (Quay D). Apart from this, a good deal of preparatory work has been done for bridges, warehouses and rail tracks.

The total length at December 31st, 1933, of the quays in use at the Port of Oslo amounted to about 11,400 yds., of which 6,520 yds. were for sea-going vessels, 1,420 yds. for Fjord and harbour vessels, and 3,460 yds. for yachts and lighters. Of this, about 10,000 yds. are under the control of the Oslo Harbour Board, representing a total ground area of about 511,000 sq. yds.

India

The Port of Jaffarabad (capital of Jaffarabad State), about 100 miles to the south of Bhavnagar on the gulf of Cambay, threatens to become Bhavnagar's serious rival, as a port, as a few ocean-going steamers called at Jaffarabad last month to unload sugar consigned to importers in Gujerat. The diversion of the Port of Bhavnagar's trade to Jaffarabad has been engaging the attention of the Bhavnagar State authorities for some time, and the State Government is reported to have taken the matter up with the Government of India.

Manchuria

The statistics for the shipping traffic through the Port of Dairen for the first quarter of 1934, as compared with the same period in the previous year, show an increase in number of ships and registered tonnage, due almost entirely to an increased foreign trade with Japan. For the period under review the figure was 1,196 ships with 3,193,000 reg. tons, as against 1,141 ships with 3,042,000 reg. tons in the first quarter of 1933. Imports into this harbour for this period amounted to 624,000 tons (469,000 tons in the 1933 period) and exports to 2,138,000 tons (against 2,321,000 tons).

New Breakwater under construction at Port Elizabeth, South Africa.

Brazil

The total number of vessels entering the harbour of Santos during the first three months of the current year amounted to 712 with 2,507,162 tons, and those leaving were 695 ships with 2,456,352 tons.

Holland

The figures for the traffic of the Port of Rotterdam for the first quarter of the current year show a considerable increase and a satisfactory development. The figures are as follows:—

	Jan.-Dec. 1933	Jan.-March 1933 (in 1,000 tons)	Jan.-March 1934
Total Imports	13,400	4,222	4,535
Total Exports	9,096	2,608	3,194

Sweden

During the month of June, 1934, 356 ships entered the Port of Stockholm from non-Swedish ports, as compared with 374 ships in May, 1934 and 391 ships in June, 1933. Of those which entered in June this year there were 110 Swedish steamships with 88,497 n.r.t., 95 foreign steamships with 93,440 n.r.t., 13 Swedish motor ships with 21,730 n.r.t., six foreign motor ships with 14,475 n.r.t., 25 Swedish motor sailing ships, 74 foreign motor sailing ships, six Swedish sailing vessels and 27 foreign sailing vessels.

South Africa

The position at the present time in regard to the more important works under construction in the harbours of South Africa is as follows:—

East London.

A new berth for oil tankers has been completed. 84 per cent. of the work in connection with the construction of a turning basin at East London had been completed by the end of April last. A wing wall at the upstream end of the main quay wall is being constructed. Five 4-ton electric wharf cranes and one 15-ton electric crane have been erected. With the erection of these cranes, the new wharf is equipped with sufficient cranes of modern design capable of working the largest mail vessels.

Port Elizabeth.

A new breakwater, which is to have a length of 4,850 ft., is at present under construction here. The breakwater (including topping) has been completed up to a distance of 4,470 lin. ft. From 4,470 ft. to the end of the present extension, the wall has been completed with the exception of topping and the placing of a certain number of 40-ton concrete blocks on the sea side to act as wave breakers. There also remains a small section of mass concrete to be completed at the end of the wall.

Altogether, 4,065 lin. ft. of timber staging has been erected, 432,041 cub. yds. of rubble and soil deposited and 3,935 wave breaker blocks placed on the mound. The length of the rubble mole for No. 1 Quay hitherto completed is 3,200 ft.

News from all Quarters—continued

No. 1 Quay Wall.—1,735 lin. ft. of foundation have been completed and 7,448—15-ton concrete blocks set, representing a length of 1,648 lin. ft. of wall, upon which mass concrete has been placed over a distance of 1,645 lin. ft. The number of cubic yards of filling placed between the North jetty and the mole is 436,396, between the new quay wall and the mole 874,278, and behind the wall 81,300. The erection of the staging and construction crane has been completed, and work is proceeding on the foundation of No. 2 Quay wall. Altogether 543—7-ton concrete blocks have been made for the work. The work in connection with the closing in of the Dom Pedro jetty has been completed to the extent of 96 per cent.

* * * *

Many South African exporters—fruit shippers especially—are wondering why the Union Castle mail steamers are not being berthed at the new Charl Malan Quay at Port Elizabeth.

According to a shipping authority, their practice of lying out in the roadstead is a serious disability which may be expensive to the port and to citrus exports this season.

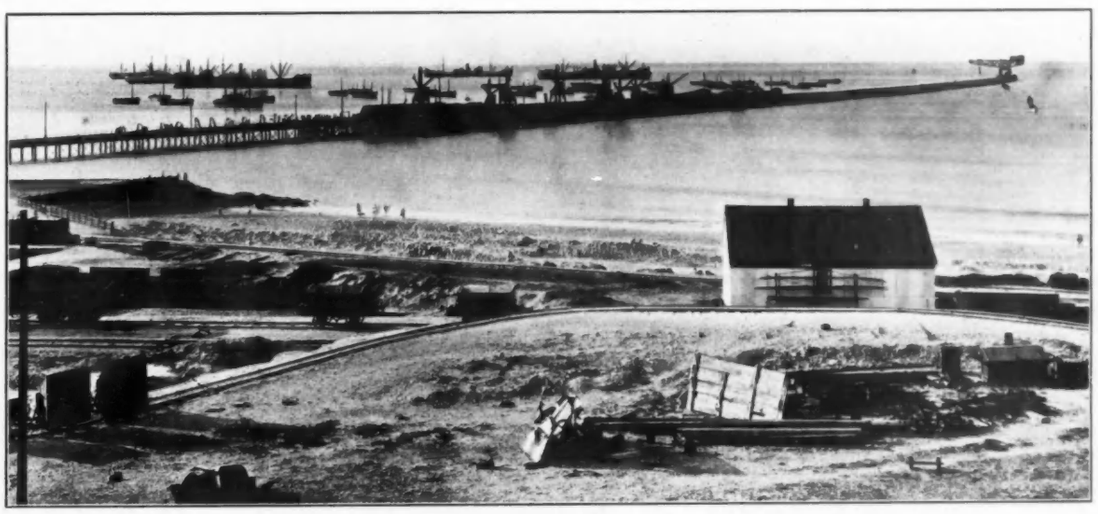
A record season, with about 750,000 boxes of citrus for export from Port Elizabeth, is in prospect, but if the old system of lighterage is to be continued throughout the season, it is inevitable that a considerable quantity will need to be diverted to Cape Town. This occurs regularly each year owing to the periodical inability of the mail steamers to lift the entire quantity of fruit awaiting shipment in the lighters. Chartered fruit ships are also to do their loading in the roadstead.

Poland

The quantity of goods through the harbour of Gdingen during the month of June was 565,152 tons, as compared with 630,118 tons in May. Over the first half of the current year imports amounted to 472,481 tons, against 360,825 tons in the corresponding period of 1933, and exports to 2,858,495 tons, against 2,259,650 tons.

For the past few weeks work on the construction of the new timber harbour at Gdingen has been in full swing. The Gdingen Marine Office has leased to the timber export agency "Paged," of the Polish Forests Department, a ground space of about thirty acres, for this purpose. There will be a quay, 200 yds. by 50 yds., from which three wooden piers, approximately 160 yds. by 11 yds. each, will extend seawards. The timber harbour will be large enough so that eight big steamers can be loaded simultaneously and will be served by three main railway lines and about seven miles of subsidiary lines. It is also proposed to erect an auxiliary saw mill.

The Polish technical press reports that a few weeks ago a private company made an agreement with the Gdingen Harbour Authorities on the basis of which these authorities will place at the disposal of the company a stretch of quay from which the company must construct, at its own expense, two piers for loading timber. Work on these piers, which it is hoped will be ready by the beginning of November, has already been started.



Ships at Anchor inside Breakwater (now under construction) at Port Elizabeth, South Africa.

According to the Union Castle Company, the mail boats will not make use of the enclosed harbour until the regular mail-boat berth has been completed. This berth is not on the Charl Malan Quay, but on No. 2 Quay, which is only in the initial stages of construction and cannot be ready for a year or two. Up to the present only two Union Castle liners have been berthed.

U.S.S.R.

Owing to the fact that the Yenissei River and bay are now navigable, it is intended to reconstruct the Port of Igarka. Among other improvements a new wharf, warehouses and other necessary buildings, including ship-repairing works, will be constructed and loading and unloading will be fully mechanised.

* * * *

During the course of the last two years the Ports of Batoum and Poti have been entirely modernised. The former has been equipped with a new quay, modern hangars and a maritime passenger station. The Port of Poti has been provided with electric cranes and new railroads, and a modern grain elevator and flour mill are in course of construction.

Danzig

The traffic through the Port of Danzig for the month of May, 1934, amounted to 379 incoming ships with 251,608 n.r.t., as compared with 389 incoming ships with 250,409 n.r.t., in April, 1934, and 395 outgoing ships with 272,088 n.r.t. in May, 1934, as compared with 387 outgoing ships with 239,501 n.r.t. in April, 1934. Imports in May were 46,257 tons and exports 508,777 tons, compared with 33,923 tons and 505,054 tons respectively in April.

Belgium

In the month of June 825 ships with 1,663,512 tons passed through the Port of Antwerp, as against 822 ships with 1,684,153 tons in June, 1933. The figures for the first half of the current year are 4,952 ships with 9,961,456 tons, as compared with 4,769 ships with 9,965,196 tons during the first six months of 1933.

The traffic through the Port of Brussels in June this year amounted to 72 incoming ships with 29,033 tons and 67 outgoing ships with 44,460 tons. In both cases this is a decrease on the figures for June, 1933.

The Antwerp Council has reduced the harbour dues for ships which only use the harbour for coaling purposes by 75 per cent. As from the beginning of June the dues for all tourist ships have also been reduced by 50 per cent. It is anticipated that dues for the dry dock, cranes and tugs will also be reduced.

Denmark

Foreign traffic through the Port of Copenhagen during the month of May, 1934, amounted to 828 steam and motor vessels with 355,676 reg. tons, as compared with 733 steam and motor vessels with 350,275 reg. tons in April, 1934, and 23 sailing vessels with 4,261 reg. tons, against 11 sailing vessels with 1,063 reg. tons in the previous month.

Canada

There was a 47 per cent. increase in shipping during the first six months of 1934 in the harbour of Halifax. This represents an increase of 355,161 tons over the first half of 1933. Cargo tonnage handled during June amounted to 131,709 tons, a 20 per cent. increase over the same month last year.

Hull and the East Coast

Construction of a Floating Landing Stage at Victoria Pier.

THE plans and draft agreement between the Hull Corporation and the London and North-Eastern Railway for the construction of a floating landing stage and other improvements at the Victoria Pier, Hull, has been under consideration by the Humber Conservancy Board. While generally approving of them the Conservancy Board desire certain alterations and a protective clause. The scheme is in connection with an improved ferry between Hull and the North Lincolnshire bank of the river jointly put forward by the Hull Corporation and the railway company and also provides for the latter carrying out at New Holland works which are to be finished contemporaneously with the completion of the Victoria Pier works at Hull, and the building of two new ferry steamers. The draft agreement also provides that, if within 15 years of the completion of the Victoria Pier works, the Hull Corporation shall construct, or be financially interested in the construction of a bridge or tunnel across the Humber, the Corporation shall pay to the railway company a proportionate part of the cost of this New Holland works and of the two ferry boats. The Hull Corporation are not to be under any obligation to carry out dredging " at, near, around or under " the Victoria Pier works. The London and North-Eastern Railway undertake to carry out such dredging operations as are necessary, and to make arrangements direct with the Conservancy Board for the disposal of the dredged material. The scheme is to cost in all about £300,000. The Hull Corporation expect to recoup their share of the expenditure by charging tolls.

Report on Progress of Trent Falls Improvement Works.

The engineer to the Humber Conservancy Board (Mr. A. E. Butterfield), in a report on the progress of the Trent Falls Improvement Works at the confluence of the Trent and the Ouse, generally known as the " fish tail," states that comparing the conditions as they were six years ago when the scheme was begun, the area of water below low water ordinary spring tides in the Rivers Ouse and Trent to the West Jetty is slightly less. Between the junction of the Ouse and Trent to the West Jetty, Walker Dyke, the area is also slightly less. The average sectional area in both rivers and the adjoining section of the River Humber, however, is slightly greater, which is regarded as satisfactory. Since November last year the whole of the conditions, Mr. Butterfield adds, has slightly improved, although he regrets to report that the width of the channel between Trent Ness and the Trent training wall, has slightly decreased. The work of heightening the training walls is proceeding steadily and the progress made considered satisfactory.

More Dock Accommodation wanted for Hull Fishing Industry.

In view of the continued growth of the Hull fishing industry the question of providing more dock accommodation arose and tentative proposals have been made to utilise the Albert and William Wright Dock hitherto used for the Baltic trades, for that purpose. Up to now the trawling industry has had the St. Andrew's Dock and its extension devoted solely to it and only recently £100,000 has been expended by the London and North-Eastern Railway, the owners, on the construction of a new Billingsgate and improvements to the old fish quays. At present the Hull fishing fleet consists of 315 steam trawlers, and in the years 1933-34 new vessels entailing an expenditure of approximately a million sterling have been added or are in course of building. The railway authorities, however, have indicated that they are not favourable to the proposal to utilise the Albert and William Wright Dock, their belief being that it is still required for the Baltic trades which they hope to see return to their former state of activity.

Humber Pilots and Increased Superannuation.

The Humber pilots have made a request to the Pilotage Committee that one of the benefit fund by-laws should be amended for the purpose of increasing the pilot's superannuation. The proposal is that Humber pilots completing 25 years' service, or attaining the age of 55 shall be entitled to superannuation at the rate of 2s. 6d. per week for every year of service. The existing basis is 1s. for every year of service prior to 1923 and 4s. per week for every year of service after that date. The matter is under consideration by the Pilotage Committee.

Trade at Hull for Second Quarter of 1934.

The shipping trade of the Port of Hull during the second quarter of the year was maintained at about the same level as in 1933. Decreased imports in one direction were offset by increases in others while exports generally did not show any marked indications of expansion. Arrivals of wheat and kindred cereals, oil seeds, nuts and kernels for the half-year ended June 30th, were something short of a million tons and 30,000 tons less than in the corresponding period last year. On the other hand imports of timber were 142,000 tons better. Imports of petroleum at 72,000,000 gallons were only slightly down. Provisions, fruit and sheeps' wool were among other imports showing some recession. During June and July when the importation of timber assumes large proportions delays at the Victoria Dock have been experienced as usual, but every effort is being made to minimise them by the dock and railway authorities, shipowners and the timber importers who are cordially co-operating to this end.

Coal Exports from Humber Ports.

The exports of coal to places abroad from the Humber ports (Hull, Grimsby, Immingham and Goole) at the end of June totalled 1,622,830 tons as compared with 1,567,683 tons in the corresponding six months of 1933. There is thus an increase in round figures of 55,000 tons. The aggregate, however, is small when compared with the figures for the year immediately preceding the operation of the Coal Mines Act. Hopes, however, are entertained that exports will be enabled to increase as a result of the arrangement to provide a separate quota of production for the export trade and of the trade agreements recently entered into with the Baltic and other countries. The costly and up-to-date coaling appliances at Hull and the other ports are at present used to not more than one-third of capacity. In addition to the export of coal the trade in bunkers in the six months utilised one-and-a-half million tons.

Scarborough Lighthouse.

The Scarborough Harbour Commissioners have decided, subject to the approval of the Trinity House, to substitute for the red harbour light in the lighthouse which indicates that there is not less than 12 ft. of water in the harbour, a white flashing light. The change is being made in order to obviate the conversion or removal of electric signs on the foreshore which at present are apt to be confused with the harbour light with the possible consequence that ships might run aground in attempting to enter the harbour at an unsuitable state of the tide.

Scarborough Harbour to be taken over by the Corporation.

The negotiations for the acquisition by the Scarborough Corporation of Scarborough Harbour came to a satisfactory conclusion at a special meeting held on July 11th when it was decided to sell the piers and harbour to the Corporation on the lines of the draft agreement which appeared in an earlier issue of *The Dock and Harbour Authority*. It was also agreed that the future management and control of the harbour shall be in the hands of a Board of Commissioners to be appointed mutually by the Corporation and the shipping interests. The decision, however, was not arrived at until the Town Council at a meeting on the 10th resolved to go to the High Court, if necessary, for the appointment of a receiver and manager unless the Harbour Commissioners agreed to meet the Corporation. The following day representatives of the two bodies met and talked over the situation and came to a satisfactory understanding. The Corporation receive the property of the Commissioners in full discharge of their indebtedness.

Immingham Dock Statistics.

During the month of June a total of 128 vessels representing a net registered tonnage of 179,383 used Immingham Docks, including 17 vessels totalling 23,826 net registered tons using the Western Jetty coaling berth, and 3 vessels of 36,214 net registered tons engaged on passenger cruises as compared with June, 1933, when 102 vessels totalling 148,930 net registered tons used the port, including 21 vessels totalling 35,300 net registered tons using the Western Jetty, and 1 vessel of 12,009 net registered tons engaged on a passenger cruise.

Manchester Ship Canal Company

The Traffic Receipts for the month of June, 1934, amounted to £108,806, against £93,982 in June last year, an increase of £14,824.

The Traffic Receipts for the half-year ended 30th June, 1934, amounted to £602,925, as compared with £574,959 for the corresponding period of last year, an increase of £27,966.

The net revenue of the whole undertaking for the half-year (after providing for interest and fixed charges) was £43,870 more than the corresponding half-year in 1933.

Tides and Tidal Phenomena†

By A. C. GARDNER, F.R.S.E., Member of the Institution of Engineers and Shipbuilders in Scotland*

TIDAL phenomena are bound up with the laws of universal gravitation and may be generally explained by saying that the waters of our earth, by reason of their particular mobility, respond more readily to the gravitational attraction of the sun or moon than do its more solid parts. This fluid mobility under the near and consequently more powerful attraction of the moon results in the heaping up of the waters under it and the formation of a wave, the crest of which, if the moon were at rest and no other disturbing causes present, would travel completely round the earth in 24 hours. Tidal predictions would then become a very simple matter, and the interval elapsing between successive high tides at any place would be exactly 12 hours. But allowance has to be made first of all for the orbital motion of the moon which is in the same direction as the diurnal rotation of the earth. The effect of this is to lengthen the time otherwise elapsing between successive high tides by an amount representing the moon's daily gain in longitude, so that the tidal interval will be that corresponding to successive meridian passages of the moon. The average interval between corresponding tides on successive days is therefore 24 hours 51 minutes, in which period there are two high and two low tides. The sun also produces an independent tide wave of its own, which modifies the effect of the lunar wave in both height and time, but owing to the greater distance of the sun from the earth the solar tide wave is smaller than the lunar wave, its tide-producing effect being only about two-fifths of that due to the moon.

In considering the causes of the tides in relation to either the sun or moon as tide-producing bodies, it is not sufficient or even correct to say that the attraction of either causes the tides; the probable causes are the differences of the attractions of the moon and sun on the solid earth and the waters nearest or farthest from them, in combination with the centrifugal forces generated in the waters of the earth revolving in conjunction with the moon. Two general theories have been advanced to account for tidal action—that of Newton known as the Statical Theory, and that of Laplace known as the Dynamical Theory, but no theory fully explains all the phenomena of the tides. Recognition of the causes enunciated above explains the phenomena which would otherwise seem to be inexplicable, namely, why high water occurs simultaneously on both sides of the earth, or why there are two tides in 24 hours at the same place. In the Statical Theory this action may be explained by reference to Fig. 1, in which E represents the

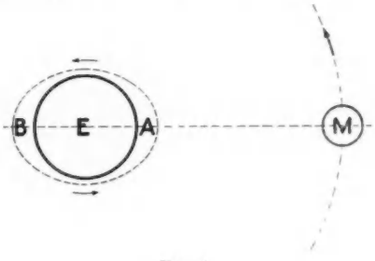


Fig. 1.

earth supposed to be covered with water, whilst M represents the moon in its orbital path. As the tide-producing effect due to the difference of attraction at any point varies inversely as the cube** of the distance from the tide-producing body, it is apparent that the moon's attraction on the near waters of the earth at A is greater than its pull on the solid earth at E, and still greater than its attraction on the remote waters of the earth at B in proportion to the cubes of the distances BM, EM, and AM, or substituting the known distance values at 33, 30, 27. Hence the difference of these attractions draws the water away from the earth at A and the earth away from the water at B, so that there are two positions of high water at the same time, one under the moon at A and another at the opposite side of the earth at B. What has been said above of the moon is of course equally true of the sun, except that the effect due to the sun is considerably less.

Considering the moon as the principal tide-generating body, Prof. Newcombe of the United States Naval Observatory put forward an ingenious explanation of this phenomenon by connecting it with the centrifugal force generated in the waters of the earth in conjunction with the attraction of the moon. As the earth's mass is 81 times that of the moon, the centre of gravity of the two bodies is situated within the earth at a point C in Fig. 2, three-quarters distant from its centre to its

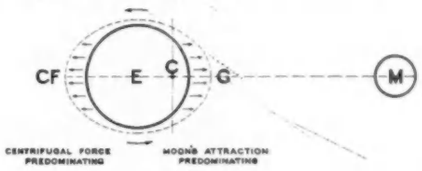


Fig. 2.

surface, and the two bodies revolve around this centre in the course of one lunar revolution. The centrifugal force caused by this rotation is balanced by the mean attraction of the moon upon the earth, and if this attraction were the same on every part of the earth there would be everywhere an exact balance between it and the centrifugal force. But on the side of the earth remote from the moon the attraction of the moon is lessened owing to its increased distance; hence the centrifugal force predominates there and the water tends to move away from the earth's centre. On the side of the earth nearest to the moon, the moon's attraction exceeds the centrifugal force, and as the earth is in independent diurnal rotation about its own axis E, there are two tides to each diurnal revolution of the earth.

When the solar and lunar tides coincide there will be an increased tide due to their sum and, vice versa, if the high tide from one coincides with low tide from the other there will be a smaller tide due to their difference. When the solar and lunar tides conspire they produce spring tides; when they are in opposition we have neap tides. We know that these occur at intervals of a fortnight when there are tides which rise higher than usual, and between these, other tides which are not so high. The explanation of this will be seen from Fig. 3 in which E

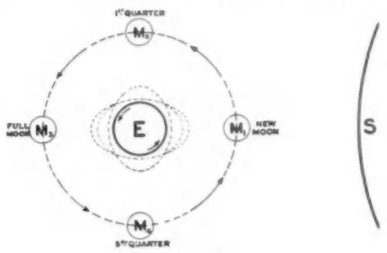


Fig. 3.

represents the earth, M_1, M_2, M_3, and M_4, four positions of the moon at intervals of a week, and S the sun. When the moon is in either of the positions 1 or 3, that is, at new or full moon, we get the highest tides of the month; similarly, when the moon is at 2 or 4, that is, in the first or third quarters at right angles to the line joining earth and sun, lunar high water coincides with solar low water, and neap tides result. From the above we are able to deduce a general theory of the tides in relation to the age of the moon, thus:

1. At new moon, the moon's age being 0, the sun and moon are in conjunction; they pass the meridian at the same time and spring tides occur.
2. At the first quarter, the moon's age being 7½ days, it passes the meridian 6 hours later than the sun. The moon is in quadrature and neap tides occur.
3. At full moon, the moon's age being 15 days, it passes the meridian 12 hours later than the sun. The sun and moon are in opposition and again spring tides occur.
4. At the third or last quarter, the moon's age being 22½ days, it passes the meridian 18 hours later than the sun. The moon is again in quadrature and neap tides recur.

Although this sufficiently explains the tidal theory in general, certain modifications are necessary to which it is desirable to refer here. First of all, there is the disturbing effect of the solar tide on the lunar tide which gives rise to a change in the normal tide interval between two successive tides because, instead of high water occurring immediately under the moon, it is made to occur on a meridian rather nearer to the sun. This is due to the fact that shortly before and after new or full moon, the sun and moon occupy such positions that the line of their resultant attraction on the earth is directed from a point somewhere between them. During spring tides the intervals are rather

† Paper read at a Meeting of the Institution of Engineers and Shipbuilders in Scotland, and reproduced by their kind permission.

* Engineer, Clyde Navigation Trust.

** See Appendix, Note I.

Tides and Tidal Phenomena—continued

shorter than the average, but at neap tides they are longer. The shortening of the average time interval is known as the " priming " of the tide, and its lengthening as the " lagging " of the tide. As previously stated, the average interval between corresponding tides on successive days is 24 hours 51 minutes, and the effect of this disturbance is to make a difference of about 13 minutes daily in the tidal interval, so that it varies between 24 hours 38 minutes and 25 hours 4 minutes.

Secondly, there is the inertia of the ocean waters to be taken into account. This causes the wave crest to drag behind the tide-producing body rather than to keep directly under it, added to which the varying depth of the ocean and the irregular configuration of its shores further alter the tidal wave and introduce complicated and divergent effects. In so far, however, as the causes are physical the results are fairly constant, with the result that at every port it is observed that high water follows the moon's meridian passage by a certain interval of time, and although this interval varies greatly for different ports it is fairly constant for the same port, and once known is most valuable in foretelling the time of high water for that particular port. It is called the " mean establishment of the port," and may be defined as the average interval elapsing between the time of high water and the preceding meridional transit of the moon. The establishment of the Port of Glasgow, for instance, is 1 hour 8 minutes, that is, the average high water occurs here 1 hour 8 minutes after the moon has crossed the meridian. How greatly it varies is shown by the fact that at Gibraltar, at the junction of two great seas, it is practically zero, while at Dover it is about 11 hours, and at Hull about 6½ hours. It might be mentioned here that the letters H.W., F. and C. on the Admiralty charts denoting High Water, Full and Change, are the times of high water (a.m.) on the day of full moon, and (p.m.) on the day of new moon, and correspond generally with the establishment of the port.

Owing to the ellipticity of the orbits of both the earth and the moon, there are yet other periodic variations in the tides which arise from the nearness or remoteness of the sun and moon with respect to the earth*. The sun's greatest and least distances from us are as 30: 29, and the moon's as 10: 9. The tides are of course greatest when the sun and moon are nearest to the earth's equator, but for the new and full moons occurring when both bodies are nearly vertical over the equator they are unusually high. As this occurs at the equinoxes, that is, at the points of intersection of the ecliptic with the plane of the equator, these exceptionally high tides are known as the "equinoctial spring tides." There is also the phenomenon known as the " diurnal inequality of the tides," that is, an observed and often pronounced difference in the height of the forenoon and afternoon tides on the same day, which may be explained by reference to Fig. 4. When the moon is farthest north of the

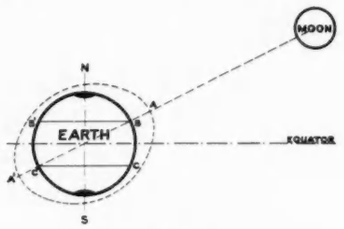


Fig. 4.

equator the tidal summits will be at A and A^1, and it will be high water at B, a station on the earth's surface. But 12 hours later the rotation of the earth will have carried the observer round to B^1 in the same latitude, when the level of high water on the succeeding tide will not be of the same height. Similarly at the station C in the same latitude in the southern hemisphere, the afternoon tide will be higher than the forenoon tide where the conditions of causation will be reversed.

The foregoing remarks may have sufficiently explained the causes of the tides for the purpose in view and the principal astronomical conditions giving rise to them, but we have yet to consider the nature of the tide itself, which is essentially that of a complex wave moving rapidly over the waters of our globe, its principal crest being under the moon and completing its journey round the earth in 24 hours 51 minutes. It is hardly necessary to say that no actual translation of water takes place as in an ocean current, but merely the vertical oscillatory movement characteristic of a wave. If a point of origin be assumed somewhere in the Southern Pacific where the expanse of ocean subject to tidal influence is greatest, the wave starts off in a north-westerly direction at a speed of about 800 m.p.h. or more spreading out in its course over the whole ocean. The speed of the wave is influenced by the depth of water, being greatest where the waters are deepest, less where they are shallow, and least of all when in proximity to wide and shallow reaches on continental shores. At isolated islands in mid-ocean where it is possible to make observations it is found that the tidal undulation is rarely more than two or three feet in height, but in narrow straights and inlets the water heaps itself higher and acquires an onward motion also which causes it to flood the surrounding shores on the rising tide, running out again on the ebb.

Great efforts have been made to trace the course of the tidal wave by noting all places at which high water occurs at the same time and, on a map of the ocean surface, drawing lines through them. These lines are called " co-tidal lines," and when plotted on a chart they indicate the approximate course of the tidal wave. Although such information can be obtained with accuracy at all coastal stations throughout the world, there are comparatively few places in mid ocean where observations can be made at all, so that such charts covering large expanses of ocean are in large measure conjectural. Such information, however, as can be derived from actual records indicates that the main or parent wave starts off the west coast of South America and moves in a north-westerly direction across the deep waters of the Southern Pacific, reacing Kamchatka in the Northern Pacific in about 10 hours. At its southern extremity, where it passes over shallow water, the wave travels more slowly and reaches New Zealand in about 12 hours, its speed having fallen to less than 600 m.p.h. on the journey. Passing Australia, it combines with the smaller tide produced by the moon in the Indian Ocean and reaches the Cape of Good Hope in about 29 hours. Entering the Atlantic, it combines with the directly produced tide there and travels northward at about 700 m.p.h. Here it is established by observation at the mid-ocean islands, that the co-tidal lines are arched considerably northwards, the central part of the wave travelling much faster than its extremities, which are dragged back by the South American and African coasts. By the time it reaches New York it is 42 hours old.

At the British Isles it is broken up, part proceeding up the English Channel and part rounding Scotland and coming down into the North Sea. A diagram of such lines around our own coasts is shown in Fig. 5. The tide at London coming from the

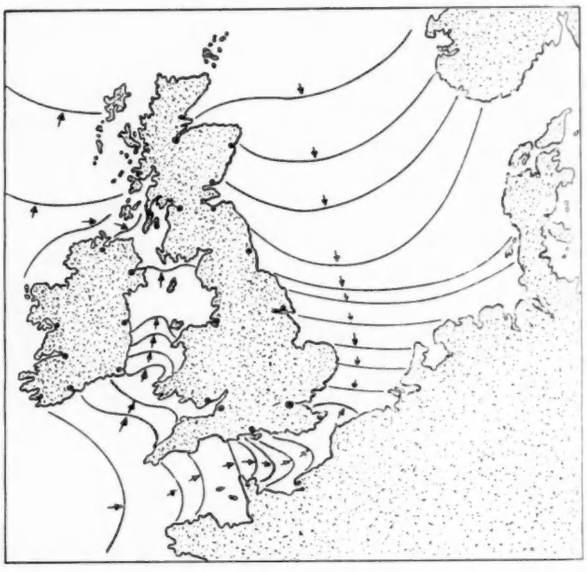


Fig. 5.

North Sea is about 60 hours old. The tide wave then sweeps onward up the coast of Norway and round Cape North into the Arctic Ocean. Thus it will be seen that there are three or four separate wave crests travelling across the great ocean spaces, all existing simultaneously and following the same track over the waters of the globe. The break-up of the tide wave frequently causes peculiar phenomena arising from tidal interference, one notable instance occurring on our east coast where the tide wave comes round both from the north of Scotland and from the English Channel. These two waves so interfere with or assist one another as to produce a tide of nearly double the normal height at one place, and hardly any rise at all at another not far away, whilst elsewhere as at Southampton, for instance, there may even be four distinct high waters in one day of 24 hours occurring in pairs and due to the passage of the tidal wave round both sides of the Isle of Wight. The same phenomenon occurs at Rochefort, whilst at Portsmouth there are two sets of three tidal peaks, and at Havre high water remains stationary for nearly an hour. In some places where the tide rushes up a funnel-shaped estuary or river it may rapidly heap up the water to a great height, as, for instance, in the Bristol Channel at Chepstow, where tides of 50 ft. frequently occur, whereas on the opposite Irish coast the tidal rise is only about

* See Appendix, Note II.

Tides and Tidal Phenomena—continued

2 ft. The tidal " bore " or aegir is another phenomenon due to the same cause where, in ascending a river, the tide advances like a wall with an almost vertical face sometimes several feet in height. Instances of this are somewhat rare, but our own rivers Trent and Severn afford examples on a small scale. These and other peculiarities arising from local conditions not always apparent or explicable are among the anomalies which make a detailed knowledge of tidal phenomena a difficult and involved study.

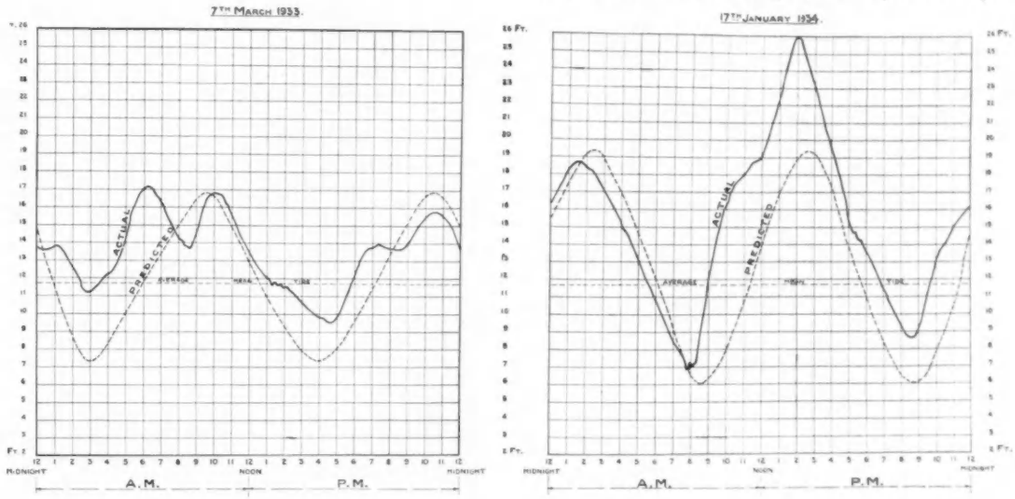


Fig. 6.

Although properly belonging to the science of terrestrial physics, the study of tidal phenomena has added much to our knowledge of astronomical science. By its agency the relative masses of the sun and moon have been calculated. Further, the westward flow of the tides has been shown to have a retarding or braking effect on the eastward rotation of the earth. The result of this is not only gradually to reduce the earth's rotational energy, but actually to increase by proportional increments the dynamic energy of the moon, the first consequence of which is to increase its velocity and the second to widen its orbit. The explanation of this lies in the fact that as the earth's speed of rotation slows down its angular momentum diminishes. But angular momentum is indestructible: it may be transferred from one body to another in a system but it cannot disappear.

Brief mention may now be made of the subject of tidal predictions, that is, the forecasting of the tides for any future period and the time of occurrence of high and low water at a given place. These predictions are made by the Hydrographic Department of the Admiralty, and are published for all the principal ports in Europe for every day of the year. The amount of labour and calculation involved in this work will be evident from a casual examination of the Admiralty Tide Tables for the current year, but the extent of it is not apparent without an explanation of the method adopted in compiling it.

In the first place it should be observed that automatic self-registering tide gauges are fitted at all mercantile ports and naval stations throughout the world. These gauges, of which those on the Clyde stations are typical, register by means of a continuous curve the varying height of the water at any moment of the day or night, but they are not necessarily—indeed, very rarely are they—records of the actual tide wave because, although they show correctly the highest and lowest water and the time of its occurrence at a station, the state of the water may be and often is affected by a number of causes which are not functions of the tide. A prevailing south-west wind, for example, blowing up the Clyde estuary near the time of high water will often pile up the water a foot or two above the level it would otherwise attain under the influence of the tide alone, whereas, lower down the coast there may be no wind and the record on the tide gauge there may be an actual tidal record. Fig. 6 shows two exceptional tides recently recorded at Glasgow, one of which exhibits two high water peaks occurring on the same tide, the first one preceding the time of prediction by nearly 4 hours, and the other the extraordinary tide which occurred on January 17th, causing extensive flooding of adjoining lands and considerable damage. The tidal predictions do not, of course, include such extraneous influences as these, which are not capable of prediction. As, however, the sun, moon and earth occupy identically the same relative positions in the heavens at the end of every period of 18 years and 11 days, tidal phenomena everywhere are reproduced under similar astronomical conditions at the end of successive periods of this duration, and an analysis of the tidal records during such a period will enable an accurate forecast to be made for any future date*.

Wind: High wind from south at midnight increased to almost half a gale at 4 a.m. then dropped to a strong breeze at 6.30 a.m., at the same time veering to 15° west of south. It then increased in intensity till 7.30 a.m., and backed to 8° west of south, then dropped slightly and veered to 20° degrees west of south at 10.15 a.m. It thereafter remained steady at about 12 to 15 m.p.h., but veering to W.S.W., and ultimately to due West.

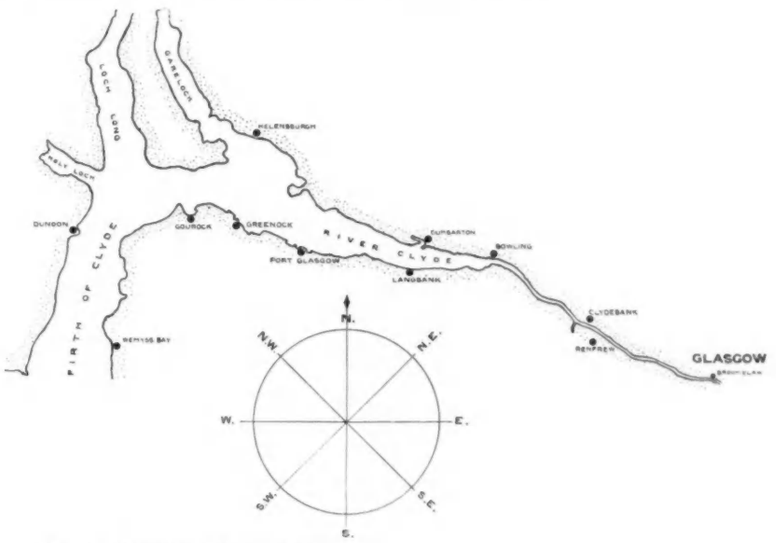


Fig. 6. Exceptional Tides at Glasgow.

The method of prediction adopted by the Admiralty is a modified form of that due to Lord Kelvin and developed by Sir George Darwin and known as the Method of Harmonic Analysis. In this method the tidal wave is considered as being made up of a series of 20 or more superimposed waves arising from the different relative positions and varying distances of

* See Appendix, Note III.

Tides and Tidal Phenomena—continued

the sun, moon and earth. The amplitude and period of each of these waves is calculated from the tide gauge records, from the recombination of which, according to the relative positions of the tide-producing forces, the composite tide wave is predicted and the tables compiled. In this connection it is necessary to observe that the prediction is a tidal prediction—not a forecast of high water, which may be influenced by other causes than those relating to the tide. This may sound a somewhat unnecessary observation, but not so unnecessary as most of those familiar with tidal operations know, when they hear such expressions as "The predictions were all wrong." Fig. 7

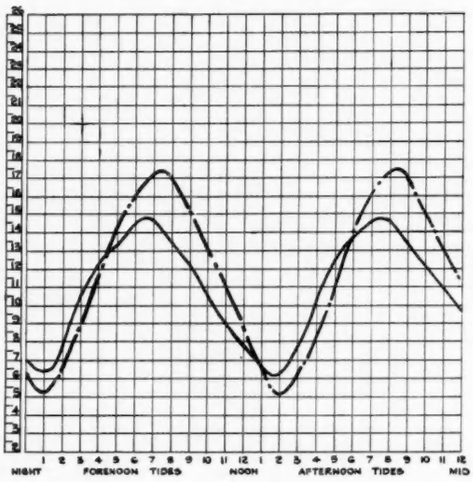


Fig. 7.

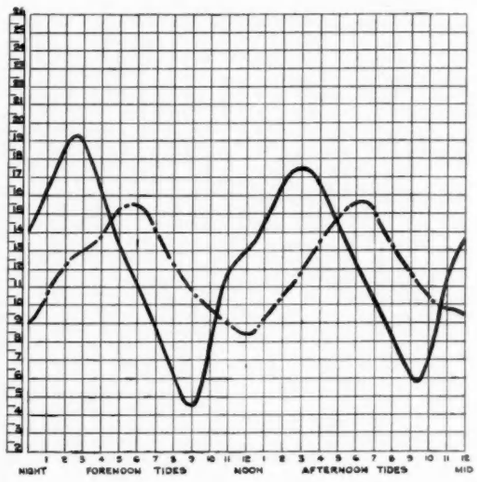


Fig. 8.

illustrates the extent to which high water may fall short of the prediction here in Glasgow due to such extraneous causes as have already been referred to.

The practical value of these tables to navigators is self-evident, seeing that all Admiralty charts show the depth of waterways at low water only, whilst the tables give the time of occurrence of both high and low water and the corresponding height of the tide. It is, therefore, only a matter of knowing the datum of the chart to calculate the height of the tide at any moment between high and low water above that basis. The value of the datum, however, seems to occasion confusion, and a word of explanation on it may not be out of place, especially as it is the zero line by which levels on land and sea are connected.

Theoretically, all heights should be referred to mean sea level, that being the point about which the tides oscillate. Moreover, mean sea level at Liverpool has been chosen as Ordnance Datum for the land survey of Great Britain, and to this level as a basis the depths of all dock entrances in the country are referred. It would, in fact, have been very convenient and would have simplified matters a great deal, especially for engineers, if it could have been adopted generally as the basis of Admiralty charts also. Its adoption for marine purposes, however, would have necessitated a correction differing for each port before the tables could be used for navigation, to avoid which each chart has its own datum, and it is to this datum as zero that the heights in the tide tables are referred. What apparent difficulty there would be in the matter is removed by the fact that the distance of the chart datum above or below the ordnance datum is given on the chart in every case, as well as its relation to the level of mean low water springs.

It is now necessary to refer to those other aspects of tidal phenomena which have a direct bearing on the professional activities of many of the members of this Institution, who are mainly concerned with the height or range of the tides as affecting engineering or shipbuilding operations. In this connection it is perhaps desirable to repeat that, whereas, in the oceans the range of the tides is comparatively small, on continental shores and coast lines which become increasingly shallow the wave not only moves more slowly but grows higher as it changes in character from an oscillation to an actual translation of water. For this reason as well as interference to which reference has already been made, the range of the tide at different places around our coast varies greatly. Here at Glasgow it is about 12 ft. at springs; at Hull it is 20 ft. and at Cardiff 36 ft. The comparative smallness of the tidal range at Glasgow is the principal reason for all the docks on the Clyde consisting of open tidal basins, whereas at Hull, Cardiff and other ports where the tidal range is considerable, entrance locks and gates are necessary to impound the water between successive high tides. Spring tides are usually of greater interest to the engineer and shipbuilder because during their occurrence the highest high water as well as the lowest low water levels are attained. This is illustrated in Fig. 8 where typical springs and neaps for the same month are for convenience plotted together. The method adopted for the division of the tides into springs and neaps at Glasgow is as follows:

Take the fourth high water after new moon and the fourth high water after full moon and divide the number of days between them into four. The middle half of this period is then taken as the period of neaps and the end quarters as portions of the springs. The remaining section of the spring group is obtained by considering in the same way the period between full and new moon. The method is illustrated in Fig. 9.

Under normal conditions the fourth high water after new and full moon is usually the highest spring at Glasgow, and the time of high water springs generally falls between the hours of 11.30 and 5.30. High water at Glasgow harbour has remained constant throughout the whole period for which records are available. On the other hand, the range of the tide which in 1755 was only 1 ft. 9 in. at the Broomielaw, has now reached 12 ft. 6 in. In other words, low water level has fallen 10 ft. 9 in. since that time due to the progressive deepening and widening of the river.

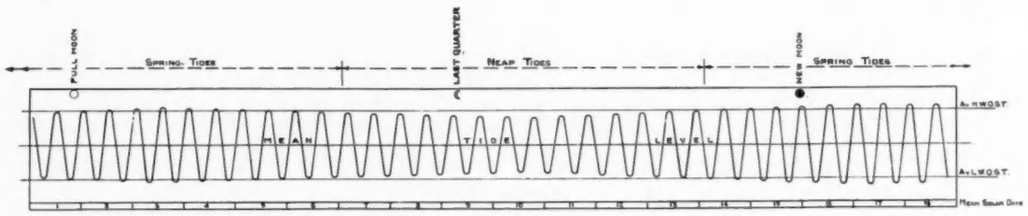


Fig. 9.

Self-recording tide gauges have been installed by the Clyde Trust at five points in the river between Glasgow and the entrance to the Clyde, so that complete records of the occurrence of high and low water are available over a long period of years and for a distance of 20 miles. These records show that in the case of a spring tide, high water occurs 45 minutes later at Glasgow than at Gourock, whilst on the ebb low water at Glasgow is now 1 hour 20 minutes after Gourock. The mean high water difference between the two places as shown by the

Tides and Tidal Phenomena—continued

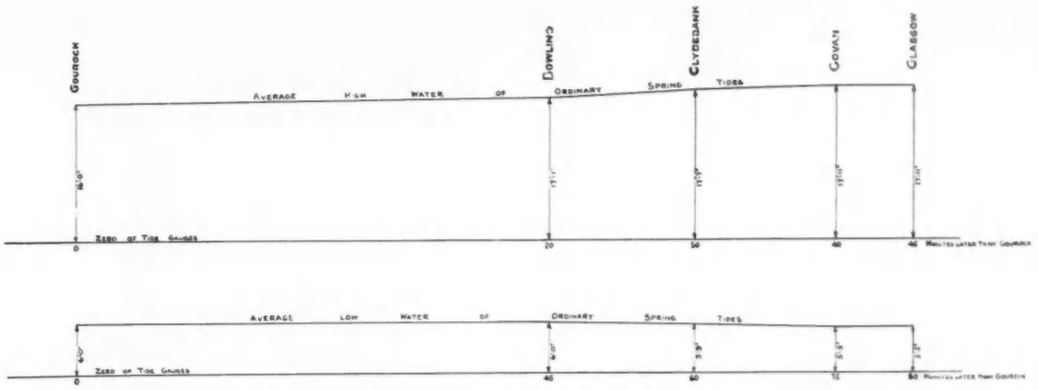


Fig. 10. River Clyde: Spring Tides.

tide gauge records for ordinary spring tides is 2 ft.; the normal time intervals and levels of the tide at the intermediate stations are shown in Fig. 10.

During the last hundred years—which covers the period in which the major improvements in the Clyde have been carried out—the duration of the tidal flow has increased by 1½ hours, whilst the duration of the ebb in the river has been shortened by approximately the same time. The duration of the ebb and flow is a matter of importance in all tidal rivers, but nowhere more so than on the Clyde whose waters are often called upon to receive some ocean leviathan from its building berth, and on completion carry it within prescribed and narrow limits of time and tide on its journey to the sea. Particular reference to the problems presented by a vessel of exceptional dimensions on its journey to the sea may, therefore, not be out of place as a conclusion to this paper, seeing that it involves the consideration of many factors to which reference has been made. The Clyde Trustees have always maintained the navigable channel of the river at a depth sufficient for the largest vessels launched from the shipyards, but occasionally a vessel of extraordinary dimensions and draught is concerned. To illustrate the method by which the margin of safety is calculated for the transit of such a vessel, the "Empress of Britain" may be taken as a typical example. It is, of course, assumed that the passage of the vessel will be made on a spring tide. A diagram is then prepared in the form of Fig. 11, on which the graph AB is laid down representing the times of high water at various places along the river in relation to the time of high water at Gourock. The second graph CD represents the calculated passage of the vessel, assuming that she starts on her journey downstream from Clydebank two hours before the predicted time of high water there, and on the further assumption that she will travel at a speed of 6 m.p.h. as far as Dunglass, 10 m.p.h. from Dunglass to Port Glasgow and 4 m.p.h. from Port Glasgow to the Tail of the Bank. Horizontal measurements on this diagram between the lines CD and AB give for any point the time before or after high water when the vessel is expected to pass. The estimated height of the tide at certain points is then obtained from the mean high tide diagram relating to that point. One of these diagrams is shown in Fig. 12. A measurement from the appropriate mean high tide diagram gives the predicted level of the tide below mean high water of ordinary springs at the place under consideration. These predicted tide levels are then plotted on a longitudinal section of the river, Fig. 13, and thus give a line representing the calculated level of the water at the time of passage of the vessel. On this longitudinal section the bed of the river is also plotted and when the draught of the vessel is known it is seen at once whether the necessary margin of flotation is assured, or whether dredging is necessary to give sufficient depth under the keel for safe navigation. On Figs. 12 and 13 are given, for comparison, the actual curves relating to the passage of the "Empress of Britain" on 5th April, 1931.

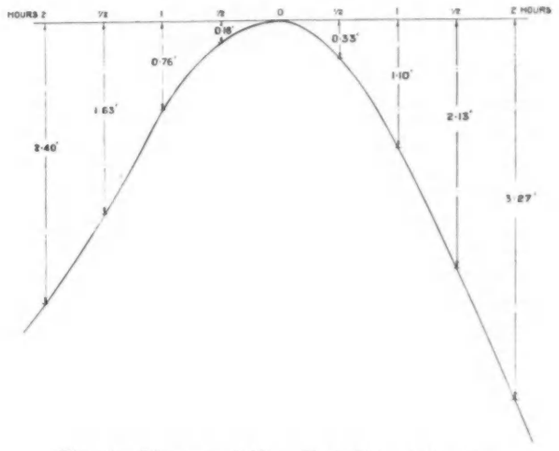


Fig. 12. Diagram of Mean High Tide at Bowling.

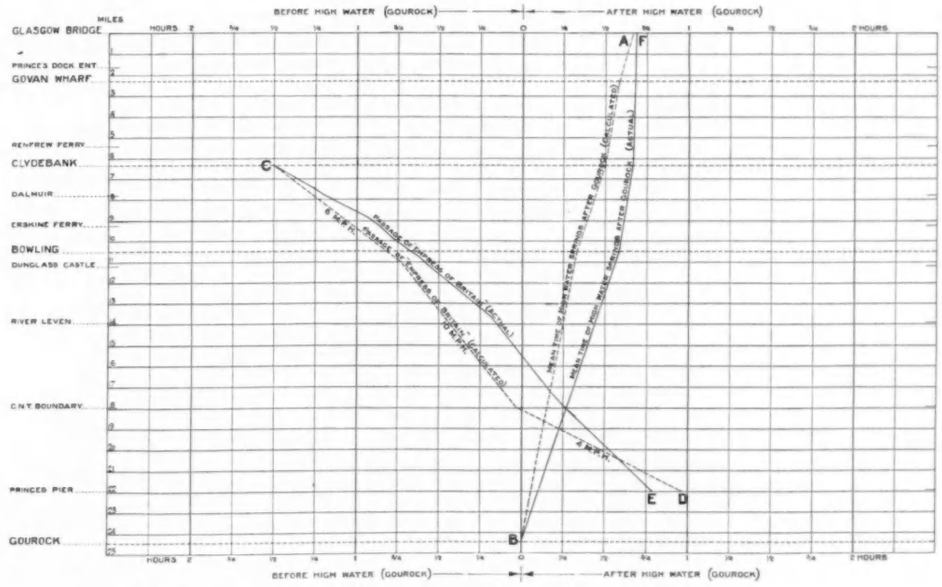


Fig. 11.

Passage down River of "Empress of Britain." Time in relation to high water at any place.

Tides and Tidal Phenomena—continued

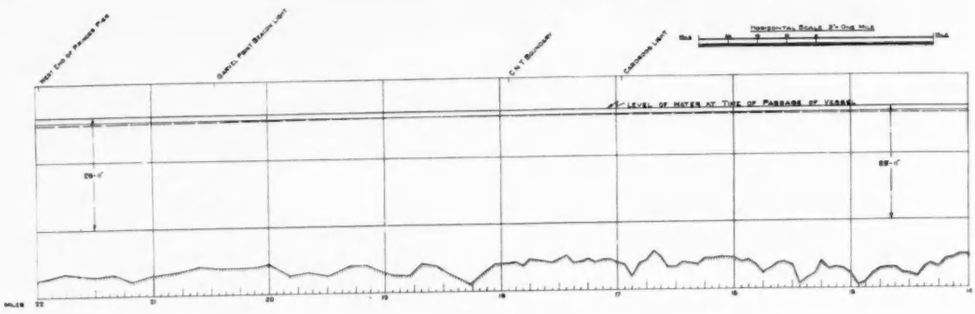


Fig. 13.

APPENDIX.

Note I.

The magnitude of the tide-producing force is relatively small, and in the case of the moon may be measured by the difference in attraction at A, Fig. 14, a point on the earth's surface and the mean attraction at the earth's centre. Let M be the mass of the moon in terms of the earth's mass, R its distance in terms

Fig. 14.

of the earth's radius, and g the gravitational constant. The acceleration due to the moon's attraction at C will be Mg/R^2 and at A, a point on its surface near to the moon, it will be $Mg/(R-1)^2$, the attraction due to gravity varying inversely as the square of the distance. The tide-raising force, f, is the *difference* of these two.

Thus $f = Mg/(R-1)^2 - Mg/R^2 = Mg(2R-1)/R^2(R-1)^2$.

But since R is a large number R may be substituted for R—1, and 2R for 2R—1, without serious error, whence we obtain as a first approximation:

$$f = Mg\ .2R/R^4, \text{ or } f/g = 2M/R^3.$$

That is, the differential attraction or tide-producing force is proportional to the mass of the tide-producing body, and inversely proportional to the *cube* of its distance.

Comparing the relative values of the moon and sun as tide-producing bodies, we have for the moon $f/g = 1/8{,}800{,}000$, when R = 60 and M = 1/81; and for the sun $f/g = 1/19{,}300{,}000$, when R = 23,400 and M = 332,000. That is, the tide-producing power of the sun is barely 5/11 of that due to the moon.

Note II.

The moon's orbit being an ellipse, has an effect on the tides arising from its eccentricity of 0.055, the ratio of the least and greatest distances of the moon being $(1-0.055)/(1+0.055)$, and since the tide-producing force varies inversely as the cube of the distance, the tidal disturbance from this cause will vary between $[1/(1-0.055)]^3$ and $[1/(1+0.055)]^3$, or between 1.17 and 0.84.

Similarly, the earth's orbit also being an ellipse with an eccentricity of 0.0166, a smaller and less pronounced disturbance will arise from the varying distance of the sun. The tidal variation from this cause will range between the limits of 1.05 and 0.95, but whereas the periodicity of the lunar variation is 27½ days only, that of the solar elliptic tide is 365¼ days.

Note III.

New moon is defined as occurring at the instant when the longitude of the moon's centre coincides with the centre of the sun. This governs the moon's phases. The interval between two successive new moons is termed a "lunation," in which period of 29.53 days, the moon makes one complete revolution relatively to the sun. But this revolution being in the same direction as the diurnal rotation of the earth, that is, from west to east, the moon gains in daily longitude, with the result that there are 28.53 transits of the moon during every lunation. The interval between successive meridional transits or the average length of the lunar day is therefore 24 hours 51 minutes. The length of a lunation is such that 223 lunations or 6,585 days equal 18 years and 11 days, which remarkable period called the "Saros" was known to the Chaldeans and is used in the prediction of an eclipse as well as in the forecasting of the tides.

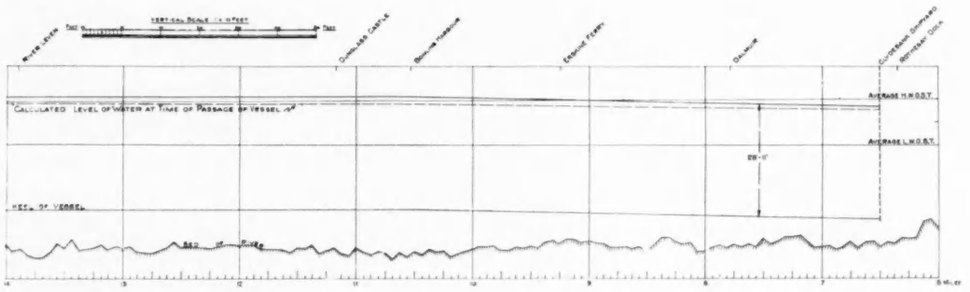


Fig. 13. Longitudinal Section of River Clyde from Rothesay Dock to Tail of the Bank, showing Passage to Sea of "Empress of Britain," on 5th April, 1931.

Port of London Notes

London's Shipping.

During the week ended June 29th, 1,050 vessels, representing 1,071,206 net register tons, used the Port of London. 671 vessels (905,047 net register tons) were to and from Empire and Foreign Ports, and 379 vessels (166,159 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended July 6th, 1,214 vessels, representing 926,997 net register tons, used the Port of London. 582 vessels (736,579 net register tons) were to and from Empire and Foreign Ports, and 632 vessels (190,418 net register tons) were engaged in coastwise traffic.

During the week ended July 13th, 1,341 vessels, representing 1,167,719 net register tons, used the Port of London. 618 vessels (931,883 net register tons) were to and from Empire and Foreign Ports, and 723 vessels (235,836 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended July 20th, 1,154 vessels, representing 1,035,065 net register tons, used the Port of London. 603 vessels (853,933 net register tons) were to and from Empire and Foreign Ports and 551 vessels (181,132 net register tons) were engaged in coastwise traffic.

Passenger Shipping.

During the month of June, fifty-six vessels, totalling 611,491 gross register tons, used the P.L.A. Tilbury Passenger Landing Stage.

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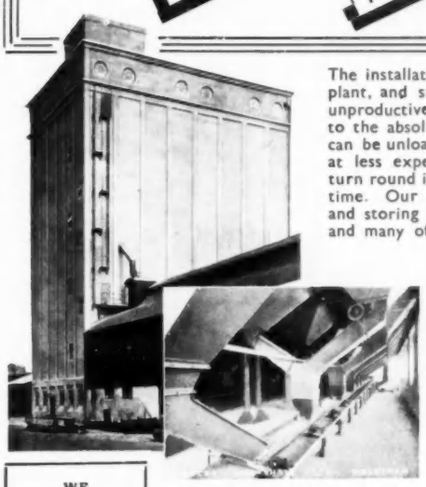

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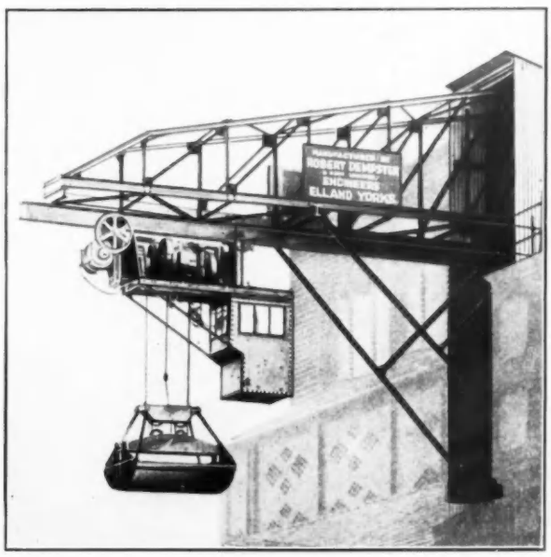

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Aden Port Trust

The returns of shipping using the Port of Aden for the month of May, 1934, are as follows:—

	No.	Tonnage
Merchant Vessels over 200 tons ...	146	602,959
,, ,, under 200 tons ...	—	—
Government Vessels	6	5,445
Dhows	156	4,983
PERIM.		
Merchant Vessels over 200 tons ...	19	51,546

The total value of imports, excluding Government Stores, was Rs. 47,57,000/-, as compared with Rs. 51,11,000/- for May, 1933, and of exports Rs. 24,82,000/-, as compared with Rs. 29,28,000/-.

The total value of both imports and exports together was Rs. 72,39,000/-, as compared with Rs. 80,39,000/- for the corresponding month last year.

Imports during the month were above those for May, 1933, in the case of grain, pulse and flour, gums and resins, hardware, seeds, sugar, grey, white and printed or dyed piece-goods, twist and yarn and manufactured tobacco; and below in the case of coffee, raw hides, raw skins, unmanufactured tobacco, and private treasure.

Exports were above those for May, 1933, in the case of coffee, grain, pulse and flour, gums and resins, raw hides, seeds, raw skins, sugar and manufactured tobacco; and below in the case of hardware, grey, white, printed or dyed piece-goods, twist and yarn, unmanufactured tobacco, and private treasure.

TRADE OF THE PORT.

Article.	Unit	Imports.		Exports	
		Quantity.	Value Rs.	Quantity.	Value Rs.
Coal	Tons	2,803	42,162	0	0
Coffee	Cwts.	7,147	2,15,573	6,687	2,17,260
Grain, Pulse and Flour	,,	63,722	2,71,732	47,579	1,90,730
Gums and Resins	,,	3,558	60,778	3,748	76,438
Hardware	—	0	27,619	0	22,184
Hides, raw	No.	440	463	5,963	5,770
Oil, Fuel	Tons	57,015	14,25,375	0	0
,, Kerosene	Gls.	36,720	29,659	5,432	3,563
,, Petrol	,,	43,479	40,736	1,616	2,019
Salt	Tons	0	0	11,750	1,04,700
Seeds	Cwts.	4,556	32,771	1,885	11,434
Skins, raw	No.	369,207	1,79,477	670,079	4,60,907
Sugar	Cwts.	19,944	1,01,187	18,355	94,808
Textiles—					
Piece Goods, Grey	Yds.	3,334,680	3,97,786	1,783,080	2,41,504
,, ,, White	,,	678,950	98,391	152,780	25,898
,, ,, Printed or Dyed ..	,,	1,361,686	2,33,577	645,505	1,29,685
Twist and Yarn	Lbs.	230,700	97,550	164,530	68,639
Tobacco, Unmanufactured	,,	1,190,532	2,09,298	289,884	52,927
,, Manufactured	,,	74,284	60,447	38,755	23,983
Other Articles	No. of Pkges.	57,875	8,87,824	18,482	4,04,972
Treasure, Private	—	0	3,44,452	0	3,44,633
Total ...	—	—	47,56,857	—	24,82,054

The number of merchant vessels over 200 tons that used the Port in May, 1934, was 146, as compared with 112 in the corresponding month of last year, and the total tonnage was 603,000, as compared with 488,000.

Excluding coal, salt, fuel oil and Military and Naval Stores and transhipment cargo, the total tonnage of imports in the month was 9,700, and of exports 6,100, as compared with 10,000 and 5,800 respectively for the corresponding month last year.

Irish Harbour Matters

Irish Shipping Services to the Continent.

An important portion of the shipping trade between Germany, Holland, Belgium and the Irish Free State has now been taken over by the newly-formed Saorstat and Continental Steamship Co., Ltd. This Company has been formed by capital subscribed in the Irish Free State, and is largely controlled by Messrs. Palgrave, Murphy, Ltd.

In a statement issued by the Company, it is pointed out that, in addition to the local vessels owned by the Company, three "Head Line" vessels have been acquired from the Ulster Steamship Co., Ltd.—the s.s. "Fair Head," s.s. "Wicklow Head," and s.s. "Teelin Head." These steamers have been re-named respectively: "the "City of Waterford," "City of Ghent," and "City of Bremen."

The new Company has also taken over from the Ulster Steamship Company their rights in their trade between Continental ports and the Irish Free State. Certain of these trades are in conjunction with Continental Companies—from Hamburg and Bremen with the Bugsier-Reedereiund-Bergungs Aktiengeselleschaft, of Hamburg, and from Amsterdam and Rotterdam, with Messrs. Hudig and Veder, of Rotterdam.

It is the intention of the new Company to continue all services as hitherto. These include a weekly service with Hamburg, Bremen, Amsterdam, Rotterdam and Antwerp; to and from Cork and Dublin with calls at Watford, Drogheda, etc., as inducement offers.

It is the intention of the new Company to do everything possible to develop services further, and also to organise any additional services which may be required for the development of trade between the Free State and the Continent.

Three steamers—the "City of Dublin," "City of Antwerp," and "City of Cork"—were, it will be remembered, acquired from Messrs. Palgrave, Murphy, Ltd., recently by the new Company.

The Limerick Steamship Co., Ltd., has maintained, and continues to maintain, regular shipping services between Germany, Holland, Belgium, and the Ports of Waterford, Tralee, Limerick, Galway, and other West of Ireland ports. The same Company has also operated services between Dublin and ports in Morocco.

As general agent in Dublin for the Continental Irish Line, which has for years past been maintaining a regular cargo service between the Ports of Hamburg and Antwerp to Cork and Dublin, Mr. D. J. Twohig states "that this service is still being maintained by us and is not to be included in the newly-formed syndicate, or to be taken as having any connection with the newly-formed company."

American Merchant Line Steamers to call at Queenstown.

Cobh (Queenstown) is to be used as a port of call for the American Merchant Line steamers, "American Importer" and "American Shipper." The "American Importer" will inaugurate the Company's New York-Cobh-Liverpool-Manchester service, which will be maintained fortnightly. Heretofore, five of these vessels have been trading between New York and London. They have a displacement of 15,100 tons, and the first West bound sailing will take place from Cobh on 6th August. This line is operated by the United States Line, whose regular service of fast trans-Atlantic liners between New York, Cobh, Southampton, Havre and Hamburg will be fully maintained.